

SmartWire-Darwin Gateways



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Caution!

The manual AWB2723-1612en is renamed from edition 06/10 in MN05013002Z-EN.

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See revision protocol in the "About this manual" chapter

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Danger! **Dangerous electrical voltage!**

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (AWA) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalisation. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 volt supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD 384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.

- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).

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About This Manual

List of revisions The following significant amendments have been introduced since previous issues:

Publication date	Page	Subject	new	Change	omitted
06/09	10, 72	Maximum expansion of SmartWire-Darwin network		✓	
	11, 73	Gateway DP and CANopen connection		✓	
	19	Note on instructions (for adapting a external device plug)	✓		
	45	Configuration and parameterization with SIMATIC S7, STEP 7	✓		
	97	Additional notes on node guarding and heartbeat mode		✓	
03/10	62	Acyclical data communication	✓		
	134, 136	EU5C-SWD-DP and EU5C-SWD-CAN version tables	✓		
	136, 138	Update of the operating system	✓		
06/10	134, 134	EU5C-SWD-DP and EU5C-SWD-CAN version tables Circuit-breaker	✓		

Overview SmartWire-Darwin The SmartWire-Darwin system makes normal electromechanical switchgears, pilot devices capable of communication. To achieve this, intelligent add-on components are added to the devices that make possible connection to the communication system SmartWire-Darwin. For communication various versions of 8-pole cables are used that make possible use inside and outside of the control panel. Communication between the SmartWire-Darwin slaves with the

overriding PLC is performed via standard field bus systems. For this purpose gateways are used that map the data of the SmartWire-Darwin network onto the field bus.

This manual describes both systems:

- PROFIBUS Gateway EU5C-SWD-DP
- CANopen coupling unit EU5C-SWD-CAN

Additional device manuals



You can find further information on the topics SmartWire and the SmartWire-Darwin slaves in the following manuals:

- MN05006002Z-EN (previously AWB2723-1617en) SmartWire-Darwin System
- MN05006001Z-EN (previously AWB2723-1613en) SmartWire-Darwin slaves
- AWB2725-1452D XI/OC signal modules

The manuals are available for download on the Internet as PDF files. They can be quickly located at

<http://www.moeller.net/de/support>

by entering the document number as the search term.

Target group

This manual is intended for automation technicians and engineers. Detailed knowledge of the field bus used is presumed. In addition you should be familiar with the handling of the SmartWire-Darwin system.

Writing conventions

Symbols used in this manual have the following meanings:

► indicates actions to be taken.



Caution!
Warns of the risk of material damage.



Warning!
Warns of the possibility of serious damage and slight injury.



Warning!
Warns of the possibility of serious damage and slight injury or death.



Draws your attention to interesting tips and supplementary information.

For greater clarity, the name of the current chapter is shown in the header of the left-hand page and the name of the current section in the header of the right-hand page. This does not apply to pages at the start of a chapter and empty pages at the end of a chapter.

1 PROFIBUS Gateway EU5C-SWD-DP

Introduction

The SmartWire-Darwin coupling unit EU5C-SWD-DP creates a connection between the SmartWire-Darwin slaves and an overriding PROFIBUS-DP master.

Surface mounting

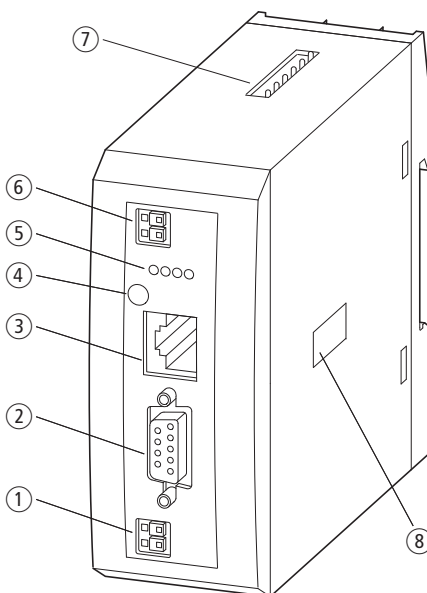


Figure 1: Front view EU5C-SWD-DP

- ① 24-V power supply POW
- ② Field bus interface
- ③ Diagnostics interface
- ④ Configuration button
- ⑤ Diagnostics displays
- ⑥ 24-V power supply AUX
- ⑦ Connection SmartWire-Darwin
- ⑧ Address switches

The SmartWire-Darwin ribbon cable is connected to the slaves at the gateway. Connection to the PROFIBUS field bus is effected via the standardized 9-pole PROFIBUS plug. In addition terminals for two power supplies are available, one for the SmartWire-Darwin slaves and another 24 volts for supply of the contactor coils in case these are also operated via SmartWire-Darwin slaves. The power supply of the SmartWire-Darwin slaves and the data communication are conducted via the 8-pole SmartWire-Darwin cable from the gateway to the slaves.

Engineering

In connection with the SmartWire-Darwin slaves the coupling unit appears as a modular slave on the PROFIBUS. Each SmartWire-Darwin slave is a module of its own. Up to 58 SmartWire-Darwin slaves can be operated via a PROFIBUS coupling unit. However, don't exceed of the maximum data volume that can be exchanged via PROFIBUS. The maximum for a PROFIBUS slave is 240 bytes of input data and 240 bytes of output data.



Information about the volume of input/output data of an SWD slave is provided in the Appendix of the manual MN05006001Z-EN (previously AWB2723-1613en) "SmartWire-Darwin Slaves".

The SmartWire-Darwin network may be extended up to 600 m.

Connection

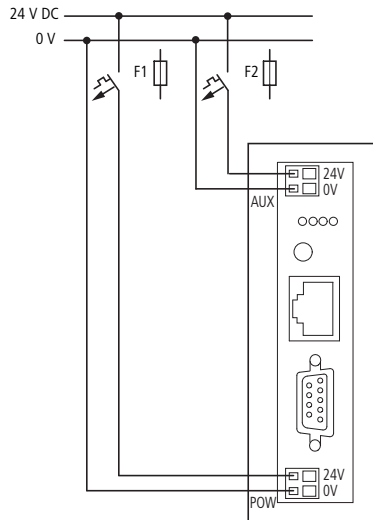


Figure 2: Connection

Power supply of the coupling unit and supply of the SmartWire-Darwin slave electronics are performed via the terminals POW. The coupling unit contains an additional power supply unit for the 15 V supply of the SmartWire-Darwin slaves with an amperage of 0.7 A.

► On the SWD gateway connect the POW and AUX supply voltages via separate miniature circuit-breakers or fuses:

- Miniature circuit-breaker 24 V DC for **POW**
 - Cable protection in accordance with **DIN VDE 0641** Part 11, IEC/EN 60898:
 - Miniature circuit-breaker 24 V DC rated operational current 3 A; trip type **C** or
 - Fuse 3 A, utilization class gL/gG
 - Cable protection for cable AWG 24 in accordance with **UL 508** and CSA-22.2 no. 14:

- Miniature circuit-breaker 24 V DC rated operational current 3 A;
tripping characteristics C or
- Fuse 3 A
- Miniature circuit-breaker 24 V DC for **AUX**
 - Cable protection in accordance with DIN VDE 0641 Part 11, IEC/EN 60898:
 - Miniature circuit-breaker 24 V DC rated operational current 3 A;
trip type **Z** or
 - Fuse 3 A, utilization class gL/gG
 - Cable protection for cable AWG 24 in accordance with UL **508** and CSA-22.2 no. 14:
 - Miniature circuit-breaker 24 V DC rated operational current 2 A;
tripping characteristics **Z** or
 - Fuse 2 A



Please take into consideration the total current consumption of your SmartWire-Darwin network and, if necessary, plan for an additional feeder module EU5C-SWD-PF2.

You can find information on the current consumption in the device operating manual MN05006002Z-EN (previously AWB2723-1617en).



If any switching devices are also to be connected, for example, via the DIL-SWD-32-001/002 SmartWire-Darwin slaves, the AUX supply will also be required. This provides the supply for activating the contactor coils. This supply must be protected by an automatic circuit-breaker (3A gG/gI or 3 A miniature circuit-breaker with a Z characteristic).

If switching devices with an activation power greater than 3 A are connected, an additional feeder module EU5C-SWD-PF1 or EU5C-SWD-PF2 must be used.

→ In the planning of the SmartWire-Darwin network you are also supported by the software program SWD-Assist, which automatically draws your attention to the use of any necessary new feeder modules.

PROFIBUS address setting

The coupling unit requires a unique PROFIBUS-DP slave address in the PROFIBUS network. This is set on the gateway via DIP switches (switches 2 - 8). The valid addresses are 1 - 125.

PROFIBUS connection

For connection to the field bus the standardized PROFIBUS plug is used, e.g. ZB4-209-DS2. This also includes a connectable bus termination resistor.

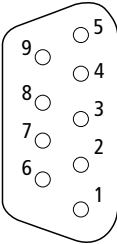
PROFIBUS-DP	Pin	Meaning
	3	RxD/TxD-P
	4	CNTR-P
	5	DGND
	6	VP (+5 V DC)
	8	RxD/TxD-N

Figure 3: Pin assignments

Baud rate

The coupling unit supports operation on PROFIBUS masters at up to 12 MB. Setting of the baud rate takes place automatically

PROFIBUS-Version

The EU5C-SWD-DP gateway supports from operating system version 1.10 the PROFIBUS version V1 (PROFIBUS version V0 with operating system version 1.0).

Programming system

A General Station Description (GSD file) is necessary for selection of the device and operation via the field bus PROFIBUS-DP. The GSD file contains standardized descriptions of the PROFIBUS slaves. Two different GSD files exist for the PROFIBUS gateway:

- For Motorola based CPU (e.g. for Siemens S7)
- for Intel-based CPUs (e.g. for Eaton XC100/200)

The further development of the SmartWire-Darwin communication system has resulted in different versions of the GSD files. The relationship between supported SWD slaves, SWD gateways and GSD files is shown in a table in the Appendix.



As of version V.2.3.9 and service pack ecp_update_0109 these files are included in the Eaton programming system easySoft-CoDeSys.

You can find these files on our web site as follows:

<http://www.moeller.net/de/support/index.jsp>

Please follow the links provided there.

Diagnostics interface

The gateways have an online diagnostics interface with the following functions:

- Update of the operating system of the SWD gateways
- Connection of the SWD-Assist for the online diagnostics of the SmartWire-Darwin network

The EU4A-RJ45-CAB1 programming cable (serial SUB-D<->RJ45) or the EU4A-RJ45-USB-CAB1 USB cable (USB<->RJ45) can be used for the connection.

The online functions of the SWD-Assist software offer a wide range of options for the display and the diagnostics functions of the SWD network even without the active PLC.

- Status indication of the inputs/outputs
- Wiring test
- Reading of the stored actual configuration
- Reading the SWD configuration
- Comparison of the target and actual configuration
- Display of cyclical and acyclical diagnostics messages

Further details are described in the online Help of the SWD-Assist software.



These online functions are available from operating system version 1.10 of the gateways and version 1.10 of the SWD-Assist software.

2 Installation EU5C-SWD-DP

Mounting

Please proceed as follows to install the device:

- First of all set the PROFIBUS slave address. This is set on the gateway via DIP switches (switches 2 - 8). The DIP switches are located under a cover on the right-hand side of the gateway. The valid addresses are 1 - 125.

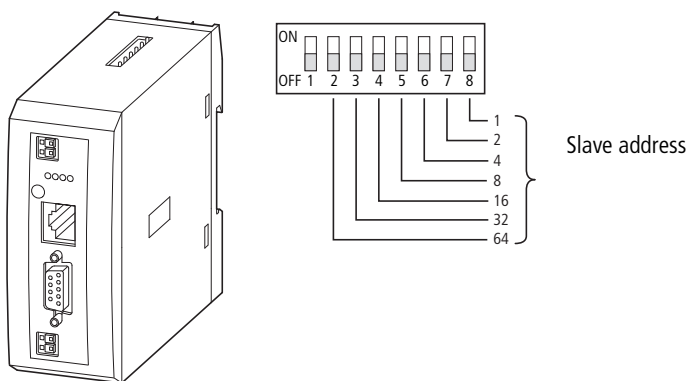


Figure 4: Setting the slave address

- Mount the device on the DIN rail.

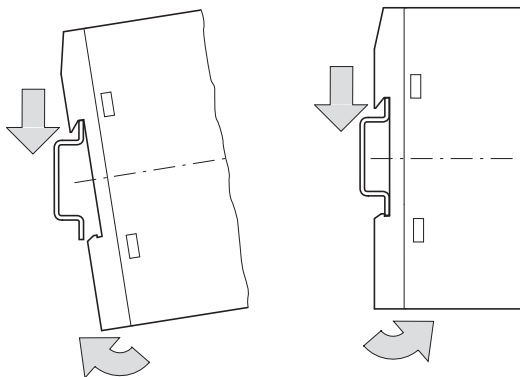


Figure 5: Mounting on DIN rail

- Connect the 24 V DC voltage to the terminals POW on the front side of the gateway.
- If necessary, connect the 24 V DC voltage for the contactor coils to the terminals AUX.

**Warning!**

In safety-related applications the power supply unit that supplies the SmartWire-Darwin system must be executed as a PELV power supply unit (protective extra low voltage).

**Caution!**

You must take safety precautions (Emergency Stop) in the external circuitry of the EU5C-SWD-DP and any power modules type EU5C-SWD-PF1-1 or EU5C-SWD-PF2-1 that are used. To do so, plan to switch off the power supply to the contactor coils AUX.

**Warning!**

Switch off the power supply, if you are reconnecting slaves in the SmartWire-Darwin system or reconnecting the ribbon cable connection. Otherwise the SmartWire-Darwin slaves can be destroyed!

Potential conditions between the components

The entire SmartWire-Darwin system operates on a common supply voltage. Provide a common star point for the earth wiring. In this way the various slaves in the SmartWire-Darwin system will not be electrically isolated from one another. The field bus and the SmartWire-Darwin system are electrically isolated from one another.



Warning!

The gateway has protection against polarity reversal for the 24-V-DC-POW supply. However, if the gateway is connected via the serial interface to an earthed device (for example to a PC), the gateway can be destroyed, if the polarity of the power supply is reversed!

Connection SmartWire-Darwin

- Connect the SmartWire-Darwin network. To do so use the SmartWire-Darwin cable SWD-4-100LF8-24 and the relevant blade terminal SWD4-8MF2 or prefabricated cables of the type SWD-4-3/5/10F8-24-2S



Detailed instructions on adapting the SmartWire-Darwin external device plug (SWD4-8SF2-5) to the 8-pole SmartWire-Darwin cable are provided in the chapter "Fitting external device plugs SWD4-8SF2-5 of the manual MN05006002Z-EN (previously AWB2723-1617en).

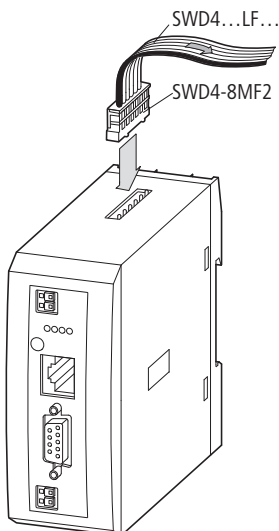


Figure 6: Connection SmartWire-Darwin

PROFIBUS-DP connection

To attach the PROFIBUS-DP cable, a special PROFIBUS-DP plug (e.g. ZB4-209-DS2) is needed. This has the necessary wiring for fault-free operation at up to 12 Mbits/sec.

- Connect the PROFIBUS-DP cable by means of the PROFIBUS-DP plug to the field bus interface of the gateway.

The first and the last slave of a PROFIBUS-DP field bus segment must be terminated with a switched on terminating resistor. The bus termination resistor is connected externally. The external connection can be implemented either with a separate terminating resistor or by a special SUB-D connector (e.g. ZB4-209-DS2).

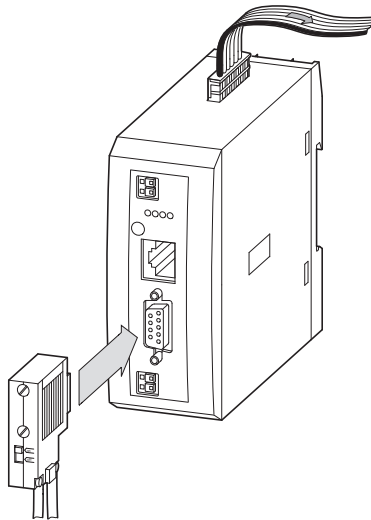


Figure 7: Connection for PROFIBUS-DP

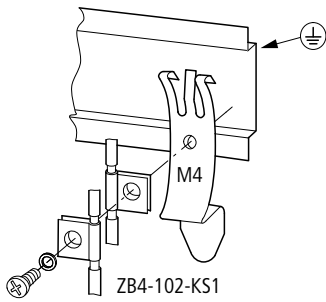
EMC-conformant wiring of the network

Undesired faults can occur on the field bus due to electromagnetic interference. This can be minimised beforehand by the implementation of suitable EMC measures. These include:

- EMC-conformant system configuration,
- EMC-compliant cable routing,
- Measures that do not allow the occurrence of large differences in potential und
- correct installation of the PROFIBUS system (cable, connection of the bus connectors, etc.)

The electromagnetic interference can be significantly reduced by the use of a cable screen (shield). The following illustrations indicate the correct method for connecting the shield.

for DIN rail



for mounting plate

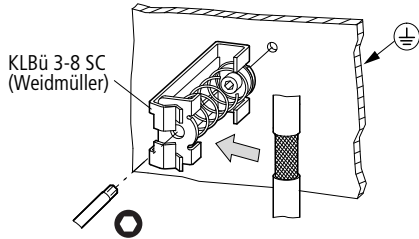
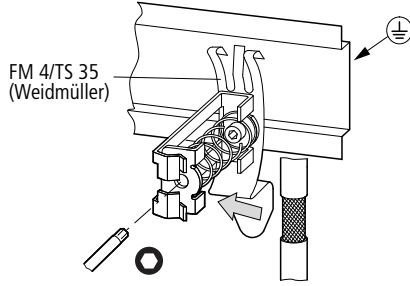
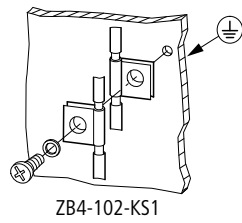


Figure 8: Shielding of network cable

3 EU5C-SWD-DP commissioning

Before switching on, check whether the power supply for the gateway is connected correctly. The configuration and installation of the SmartWire-Darwin network must also have been carried out correctly (with all slaves connected).

If you have already integrated devices into a system, secure the operating range of any connected parts of the system against access so that nobody is endangered, for example, by motors starting up unexpectedly.

Commissioning takes place in several steps:

- ▶ Put the SmartWire-Darwin network into operation.
- ▶ Create a connection to the field bus.
- ▶ Load and start the PLC program.

Putting the SmartWire-Darwin network into operation

Before the gateway can exchange data with the PLC, a valid SmartWire-Darwin network configuration (a so-called gateway target configuration) has to be stored in the gateway. This is compared with the current configuration (actual configuration) each time the gateway is restarted. If the gateway ascertains in this process that a SmartWire-Darwin slave cannot be reached or a wrong slave type is determined, the SmartWire-Darwin network will not go into operation (to be precise this is dependent on the network configuration). Reading of the SmartWire-Darwin network configuration takes place by pressing the configuration button on the gateway. All SmartWire-Darwin slaves are re-addressed in ascending order in the process. This process may only take place in the case of:

- initial commissioning,
- the replacement of a defective slave or
- a change to the configuration.

**Warning!**

If a SmartWire-Darwin slave has failed, the SmartWire-Darwin network can still be operated with the remaining slaves, depending on the configuration setting (even after a repeat power up of the gateway). The failure is reported to the application.

If there is a faulty configuration and the configuration button is pressed, only the slaves up to the failed device are addressed and stored. Use of the remaining slaves is not possible until the defective slave has been replaced and the configuration has been read in again by pressing the configuration button.

Switching on for initial startup, a replacement or a changed SmartWire-Darwin configuration

Prerequisite for reading the configuration:

- All SmartWire-Darwin slaves are connected to the SmartWire-Darwin line.
- The SmartWire-Darwin network is connected to the gateway.
- The voltage POW is applied to the coupling unit and the power LED lights up.
- The voltage AUX is applied (if necessary).
- The SmartWire-Darwin status LEDs of the SmartWire-Darwin slaves are on or are flashing.
- If necessary remove the PROFIBUS fieldbus terminal from the SWD gateway.

- Press the configuration button on the gateway for at least two seconds. The SmartWire-Darwin status LED on the gateway begins to flash orange. The SmartWire-Darwin status LEDs on the SmartWire-Darwin slaves also flash.

All slaves are addressed in sequence, the complete configuration is stored retentively (coupling unit target configuration). The gateway is then restarted (see following section).

Switching on when the gateway target configuration is stored

If a configuration is stored in the gateway, each time the supply voltage is switched on it is checked whether the slaves actually found on the network comply with the stored gateway target configuration. The result of the check is displayed via the SmartWire-Darwin status LED on the gateway:

Description	SmartWire-Darwin status LED	Data interchange between the gateway and SmartWire-Darwin slaves
The current actual configuration complies with the gateway target configuration.	Green continuous light	Yes
A necessary SWD slave is missing or the coupling unit target configuration does not comply with the actual configuration.	Flashing (red)	no
Slave addressing is active (after power On or the download of a planned configuration with empty modules).	Flashing (green)	no
Short-circuit on the 15 V power supply or no SmartWire-Darwin slave is connected.	Red continuous light	no

Creating field bus communication

If a data interchange is possible between the SmartWire-Darwin slaves and the coupling unit, in principle communication between the coupling unit and the controller can also be performed via PROFIBUS.

- Connect the PROFIBUS coupling unit to the field bus.
- Load the program into the PLC.

The configuration of the PROFIBUS network is transferred to the PROFIBUS master when the program is uploaded onto the controller. The configuration of the SmartWire-Darwin network is transferred to the PROFIBUS master when the program is uploaded and onto the gateway. If the planned configuration complies with the stored gateway configuration, all status LEDs indicate a green continuous light.

Any errors that occur are indicated via the DP status LED and the Config status LED.

Table 1: Error messages

Description	PROFIBUS status LED	Data interchange between the gateway and the PLC via PROFIBUS
Cyclic data communication runs on the PROFIBUS. The planned configuration complies with the gateway target configuration.	Green continuous light	Yes

Description	PROFIBUS status LED	Data interchange between the gateway and the PLC via PROFIBUS
The DP master does not detect a data interchange, because the planned configuration does not comply with the gateway target configuration.	Flashing (green)	Yes
No communication takes place on the PROFIBUS. No DP master is detected (for example, on account of a wrong slave address).	off	no
Extended DP diagnostics: The input data from SmartWire-Darwin slaves is invalid or the necessary slaves are missing.	Orange	Yes

So the prerequisite for data interchange is that the configuration drawn up on the PLC system (= planned configuration) complies with the configuration actually available on the gateway. The result of this check is signalled on the gateway via the SmartWire-Darwin configuration LED.

Table 2: Signals of the SmartWire-Darwin configuration LED

Description	SmartWire-Darwin-configurations LED	Data interchange between the gateway and the PLC via PROFIBUS
The planned configuration complies with the gateway target configuration.	Green continuous light	Yes
The planned configuration does not comply with the gateway target configuration, but is compatible with it. (list of the devices that are compatible with one another → Table 15, page 127.)	Flashing (green)	Yes
The planned configuration and the gateway target configuration are not compatible.	Red continuous light	no

4 Programming the EU5C-SWD-DP

Introduction

The SmartWire-Darwin gateway is integrated into the PROFIBUS configurator of the programming system as a DP slave. A General Station Description (GSD file) which contains a standardized description of the SmartWire-Darwin coupling unit is necessary for this. Depending on the PROFIBUS master used two different versions are available for this:

- For Motorola based CPU (e.g. for Siemens S7)
- for Intel-based CPUs (e.g. for Eaton XC100/200)

The further development of the SmartWire-Darwin communication system has resulted in different versions of the GSD files. The relationship between supported SWD slaves, SWD gateways and GSD files is shown in a table in the Appendix.



As of version V.2.3.9 and service pack ecp_update_0109 these files are included in the Eaton programming system easySoft-CoDeSys.

Otherwise you can find the current version of the GSD files on our web site at www.moeller.net in the Support section. In this case load the relevant GSD files with the relevant bitmap files into the relevant directory of your programming system. Please refer to the documentation for your programming system for information on this.

For the Eaton programming system easySoft-CoDeSys this folder is in:

C:\Program files\Common files\
CAA-Targets\<Version>\PLCConf

The installed version for this is, for example, Moeller V2.3.9.

Configuration and parameterization with easySoft-CoDeSys

The connection of a SmartWire-Darwin network via the gateway EU5C-SWD-DP to the controller XC200 is described in this chapter. Please check beforehand whether you have a current easySoft-CoDeSys version installed with the necessary GSD files.

Then please proceed as follows:

- ▶ Start easySoft-CoDeSys and open a project.
- ▶ Open the controller configuration and select the PROFIBUS master module XIOC-NET-DP-M. This must be positioned on the first three slots.

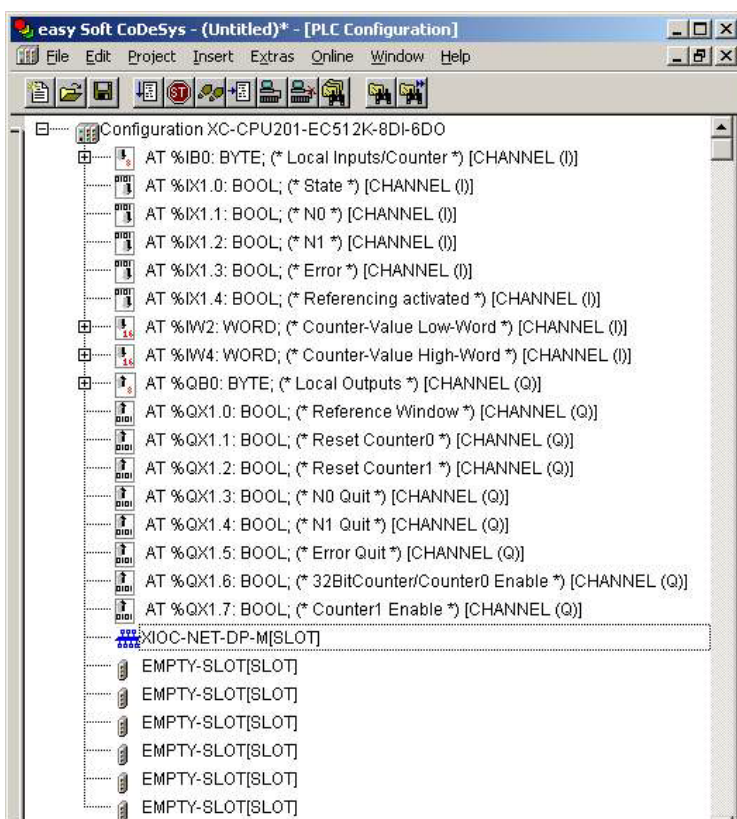


Figure 9: Selection of the DP master

- Select the DP master module and choose **Insert -> Append Subelement** to open the selection list for the DP slave modules. Select the correct version of the EU5C-SDW-DP gateway.

The relationship between supported SWD slaves and GSD files is provided in the EU5C-SWD-DP version table in the Appendix on page 134.

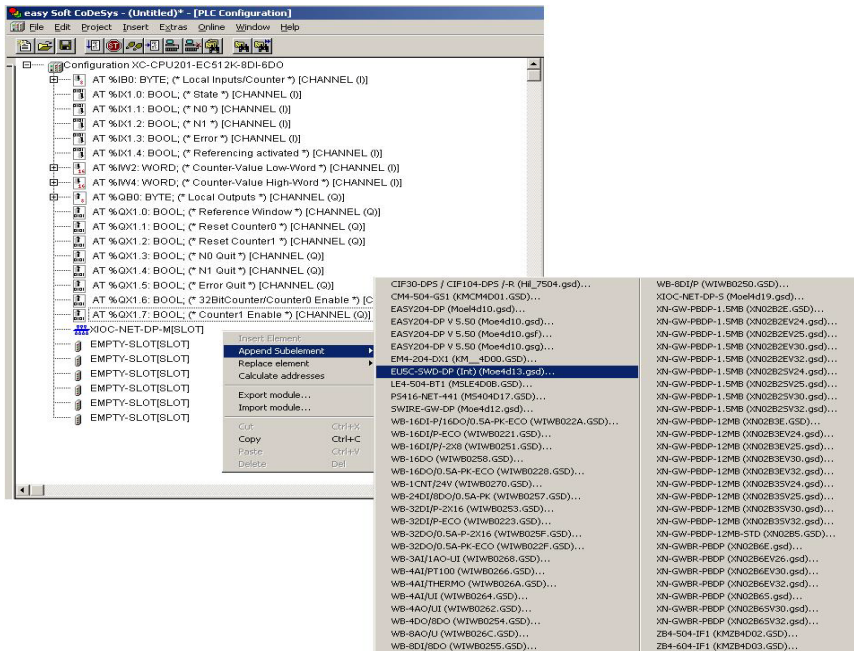


Figure 10: Selection of the gateways

Installing a project-specific GSD file

The “SWD-Assist” planning and ordering tool enables you to create a complete SWD network. It is also possible to create a project-specific CoDeSys-compatible GSD file with the software. SWD-Assist stores the GSD file under the name of the current project with the appropriate extension, such as SWD_Proj.gsd. This can be installed in CoDeSys in the same way as the standard GSD file.

- Install the project-specific GSD file in the folder provided for storing the default GSD file.

For the Eaton programming system easySoft-CoDeSys this folder is in:

C:\Program files\Common files\
CAA-Targets\<Version>\PLCConf

The installed version for this is, for example, Moeller V2.3.9.

The project-specific GSD file can now be used like the default GSD file.

Selection of the SmartWire-Darwin slaves

- Change over to the **Input/Output** tab.
- Now select here the SmartWire-Darwin slaves that you require for your SmartWire-Darwin network. Please heed of the correct sequence. The modules must be configured just as they will be arranged afterwards in your application.

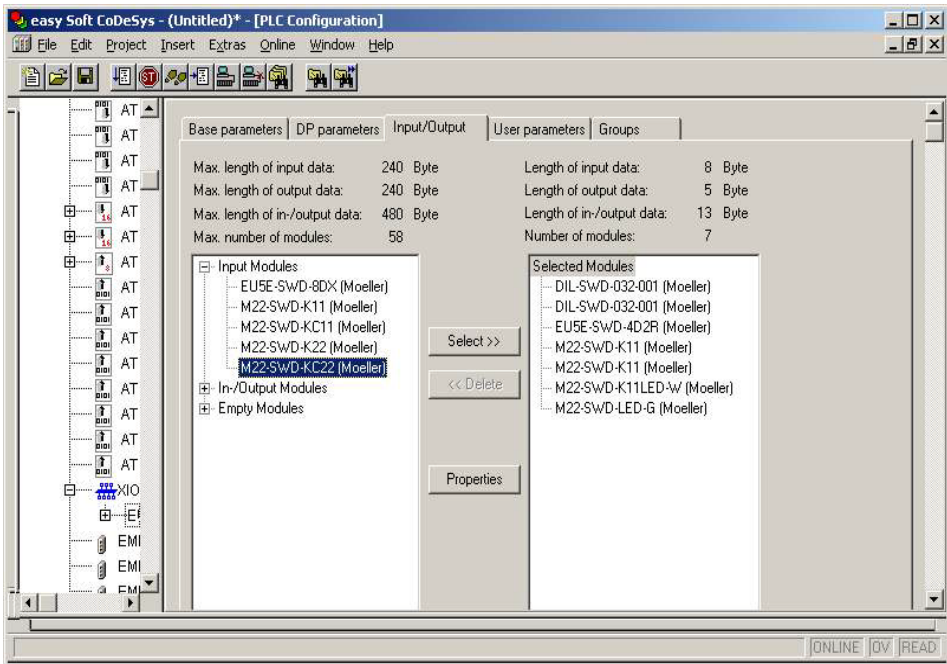


Figure 11: Selection of the slaves

Parameter setting

Parameters for communication of the coupling unit with the PROFIBUS master and with the SmartWire-Darwin network are also defined in the controller configuration.

The meaning of the individual tabs:

“Base Parameters” tab

You can define here the I/O start addresses for the mapping of the SmartWire-Darwin slaves onto the inputs/outputs of the controller map. As standard the programming system creates complete connection to the I/Os up to now. You can, however, change these values to other, unassigned areas.

“DP Parameters” tab

The parameters that relate to communication with the field bus PROFIBUS-DP are entered under these settings. These include, for example, the DP-slave address (node ID) or the monitoring time (watchdog control).

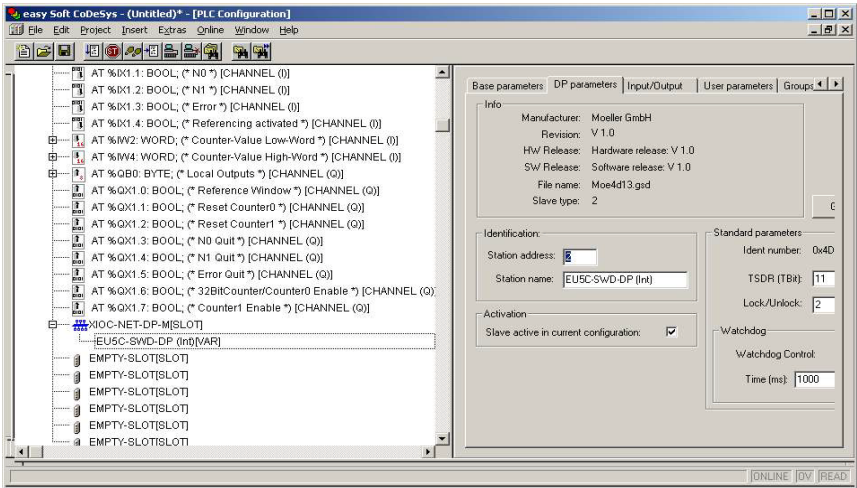


Figure 12: Setting the DP parameters

“User parameters” tab

Application parameters define the general specifications of the gateway and SmartWire-Darwin slaves.
The following table shows the parameters, their meaning and setting facilities.

Table 3: User parameters

Parameters	Value	Meaning
SmartWire-Darwin baud rate	125 Kbit/s (Default) 250 Kbit/s (from operating system version V1.10)	The baud rate of the SWD network
Compatible devices allowed (Compatible devices permissible)	No	The planned SWD slaves in the configuration must comply with the SWD slaves of the stored gateway target configuration. If not, no data interchange takes place with the DP master.
	Yes	Data exchange takes place if the connected SWD slaves are compatible with the SWD slaves in the configuration. This is displayed via the status LED on the device.
All slaves optional (All devices are optional)	Defined for each slave (Define for each device)	Specification is performed individually for each slave (→ section “Parameters of individual SmartWire-Darwin slaves”)
	Yes	Data transfer to the Profibus also takes place for a random number of failed SWD slaves. The setting in the module parameters has no effect.

Setting specific parameters of SmartWire-Darwin slaves

You can parameterize the start-up behavior for each SmartWire-Darwin slave. By doing this you define how the gateway reacts, if a slave is not available. The standard setting is that all slaves have to be available. However, the information as to whether a slave is available is also reported to the application via the diagnosis so that the failure of a slave can be reacted to individually here (→ section “Diagnostics”).

Changing the setting

- ▶ Select the corresponding SmartWire-Darwin module in the **Input/Output** tab in the table “Selected Modules”.
- ▶ Press the pushbutton **Properties**. The dialogue field **Module Properties** relating to the selected module is displayed. By double-clicking on the entry **Device shall be present** the column **Value** changes to **Device may not be present**.

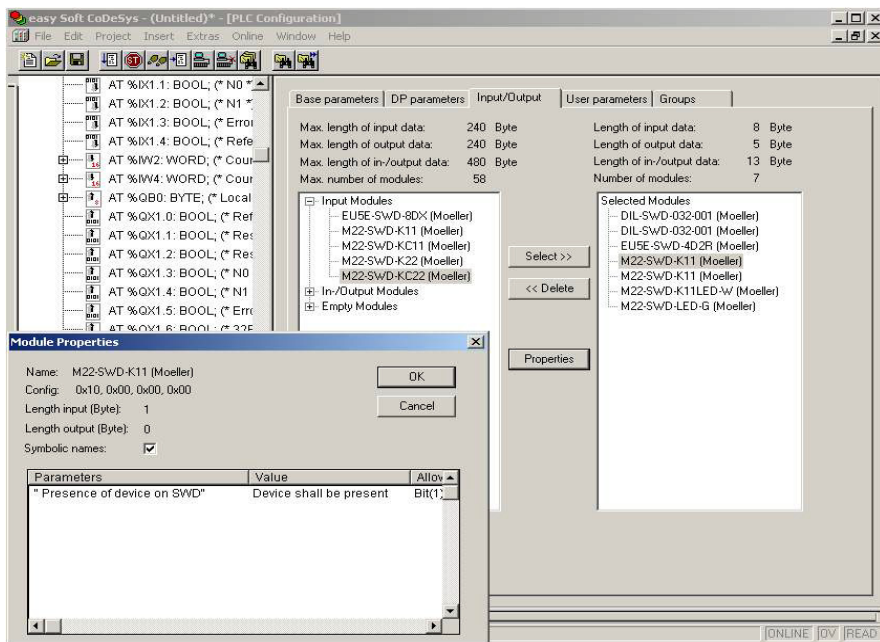


Figure 13: Parameterizing SWD slaves (= module)

Parameter setting at this point only makes sense if the value **Defined for each slave** is set in the user parameters for the parameter **All Slaves optional**.

Input/output addresses

With the configuration of the SmartWire-Darwin slaves in the PLC configurator the input/output addresses of the slaves are assigned automatically. Assignment of the addresses to the individual SWD slaves can be viewed in the PLC configuration.

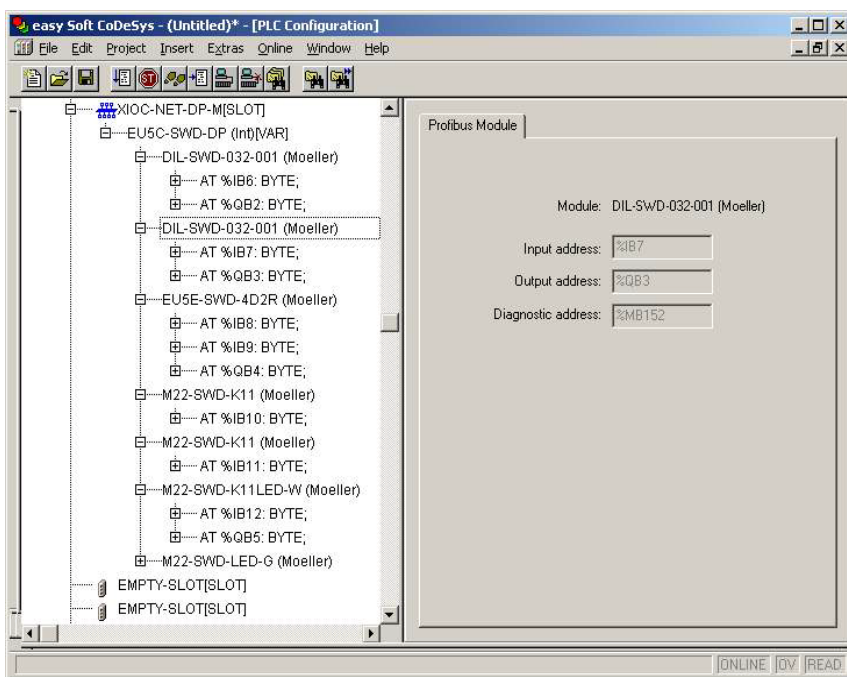


Figure 14: SWD slave addresses

The inputs and, if necessary, the outputs are used as "normal" local inputs/outputs in the application program.



Please refer to the manual previously MN05006001Z-EN (AWB2723-1613en) for the configuration and meaning of the input and output data.

Acyclical data communication

SmartWire-Darwin slaves such as the PKE-SWD-32 module for the electronic motor protective circuit breaker also supply acyclical data in addition to the cyclical data. Function blocks from the xSysNetDPMV1.lib library are used with XC100/200 controllers for reading and writing acyclical data.

The library contains the function blocks

XDPMV1_READ,
XDPMV1_WRITE.

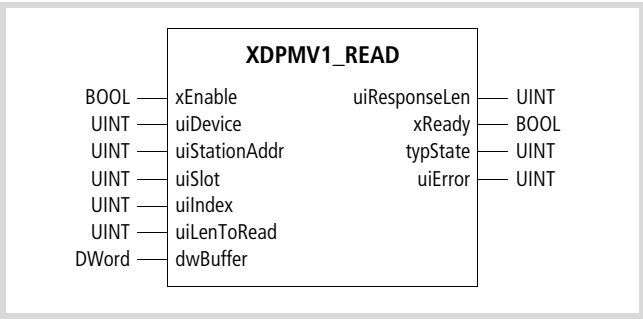


Figure 15: Prototype for the function block XDPMV1_READ

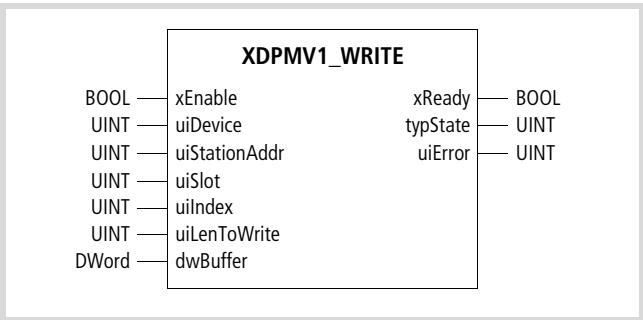


Figure 16: Prototype for the function block XDPMV1_WRITE

The data of the SWD slaves which can be read or written acyclically are described in the following as DP-V1 objects. The number and meaning of the available DP-V1 objects are described in the relevant slave documentation (e.g. MN05006001Z-EN (previously AWB2723-1613en) "Smart-Wire-Darwin slaves").

The address of a DP-V1 object is defined by the slot number (uiSlot), the index (uiIndex) and the read/write data length.

The slot number corresponds to the address of the Smart-Wire-Darwin slave. The first slave therefore has the slot number 1, the second 2 etc. The index addresses the V1 object. Also here, the first object is assigned the number 1, the second 2 etc. With the SmartWire-Darwin slave PKE-SWD-32, object 1 supplies the current value I_{rel} .

Please observe the following guidelines when using these function blocks:

- Do not access these modules cyclically as it will unnecessarily load cyclic bus operation.
- For each master program a maximum of one function block for reading and one function block for writing.
- Interlock the read and write function blocks so that only one function block can be active at a time!

The slaves must therefore be accessed consecutively via the function blocks. DP-V1 objects of a slave must also be processed consecutively.

General handling guidelines for the modules

- ▶ Apply a "1 signal" (positive/rising edge) to the "Enable" input in order to start a job. After the job is complete the "Ready" output will be set to the "1" state.
- ▶ Evaluate then the "typState" output. If the output value is "3" (job properly processed), the job was correct completed. If the output value is "4", this indicates an incorrectly completed job. In this case, evaluate the "uiError" output.

Operand significance

xEnable	Start
uiDevice	Device number (see table below)
uiStationAddr	PROFIBUS-slave-address of the SWD-Gateway
uiSlot	SWD slave address (value range 1 to 58)
uiIndex	Object index
uiLenToRead	Length of read data in bytes (value range 0 to 240). If the read data length is unknown, enter the maximum value of "240". The actual read byte length is indicated by the "uiResponseLen" output.
uiLenToWrite	Length of write data in bytes (value range 0 to 240). If an error message appears if you do not enter the exact value.
dwBuffer	Address to a buffer
uiResponseLen	Length of data actually read (bytes)
xReady	Job process state
typState	State of module 0: not being processed 1: invalid parameter 2: started 3: job successfully completed 4: job completed incorrectly. Evaluate error code at "uiError" output
uiError	Error code see Table 5 („Error codes")

Function block assignment (Device number)

Up to three DP modules can be used with the XC200. Each of these DP modules can use one function block for acyclical read operations and one function block for acyclical write operations. In all a maximum of six function blocks can therefore be used in the user program. Using device numbers you determine which function block is assigned to which DP module. The device number depends on the DP module slot and is defined in the following table.

With the XC100 the device number is generally “0” as only one DP-module can be used by this control.

Table 4: Device number for XC200

XI/OC slot	1	2	3	
Module	DP-M	DP-M	DP-M	
Device No.	0	1	2	
Module	DP-M	DP-M	X-module	
Device No.	0	1	–	
Module	X-module	DP-M	DP-M	
Device No.	–	0	1	
Module	DP-M	X-module	DP-M	Configuration fault: Gaps are invalid!
Device No.	0	–	2	
Module	X-module	X-module	DP-M	
Device No.	–	–	0	

X-module: Module (No PROFIBUS-DP module)

Error code at "uiError" output

Table 5: Error codes

2	No resources for job processing are available in the SWD gateway (internal fault)
3	The master has not activated the DP-V1 mode for this SWD gateway. Check the DP configuration!
9	Invalid response (internal fault)
17	No response from this SWD gateway. Possible causes: • "uiStationAddr" entry incorrect • SWD gateway or fieldbus not active
18	General bus fault • Check bus cables • Check master • Check the DP address or high station address from further masters in the configuration
25	Unintelligible response, SWD slave is not compliant with the DP-V1 standard
54	Incorrect answer
129	DP-V1 communication has not been configured and activated or the PROFIBUS slave address does not exist.
130	DP-V1 communication has been blocked, PROFIBUS station is incorrect.
131	A job is still active (internal FB error)
132	Parameter and data fault (internal fault)
133	Parameter fault Possible causes: "uiStationAddr", "uiSlot" or "uiIndex" are incorrect.

**Configuration and
parameterization with
SIMATIC S7, STEP 7**

The connection of a SWD network via the SWD gateway EU5C-SWD-DP to the controller S7-300/400 is described in this chapter.

- ▶ In your project open the HW **Config** configurator and check whether the SWD gateway is located in the directory **Hardware Catalog, PROFIBUS-DP -> Additional FIELD DEVICES -> switchgears**.
- ▶ If not, install the appropriate GSD file as described below.

The GSD file contains all the properties of an SWD gateway as a DP slave.

Installing the GSD files for an S7 controller

The standard GSD file, which can be downloaded from the Internet, can be used for the installation. Alternatively, a project-specific GSD file that was created beforehand with SWD-Assist can be used

Installing the GSD standard file

- ▶ Download the standard GSD file via the Internet from the Support page. Enter SWD or GSD at <http://www.moeller.net/de/support/index.jsp> in order to find the file quickly.
- ▶ Start the download via **Software -> PROFIBUS-DP Communication Feature List (GSD) for the Smart-Wire-Darwin gateway EU5C-SWD-DP**.
- ▶ Save the packed standard GSD files with the designation **EU5C-SWD_STEP7.zip** in a suitable project folder and unpack them.

They contain the currently available GSD files for specific languages:

- Moel4dxx.gsd (English)
- Moel4dxx.gsf (French)
- Moel4dxx.gsg (German)
- Moel4dxx.gsi (Italian)
- Moel4dxx.gss (Spanish)
- as well as the appropriate figures KM4D13_D.bmp and KM4D13_N.bmp.

xx = Version of the GSD file. You will find details on this in the Appendix.

► In STEP 7 install all GSD files via **Options -> Install GSD File...**

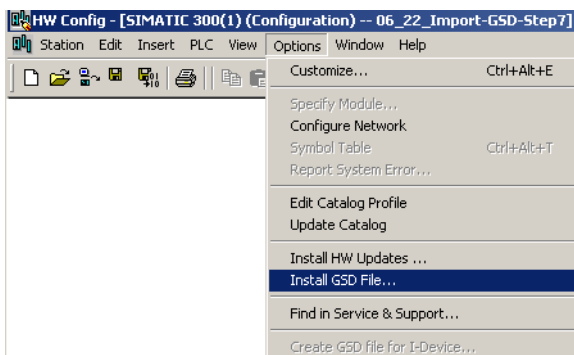


Figure 17: Starting the installation of the GSD file

- In the dialog that opens choose the option **From the directory** from the **Install GSD Files** list and select the appropriate directory.

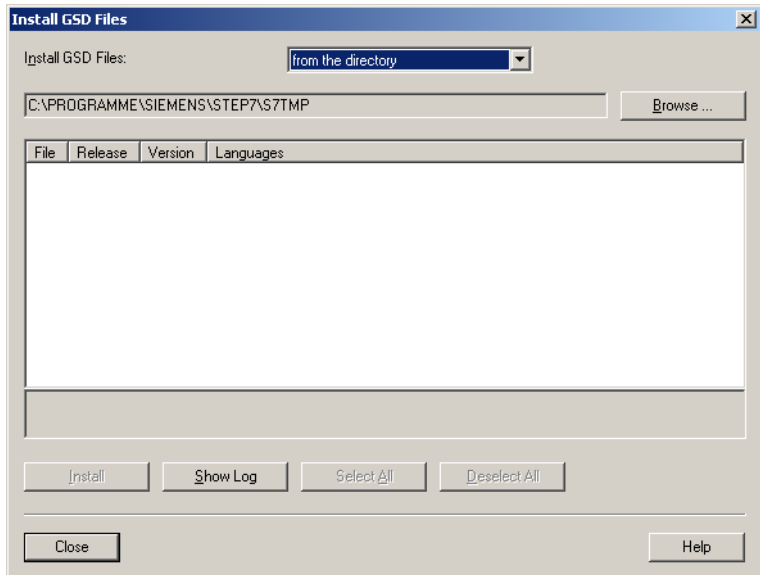


Figure 18: Installing the GSD file - Search

► Choose the required GSD file and click the **Install** button.

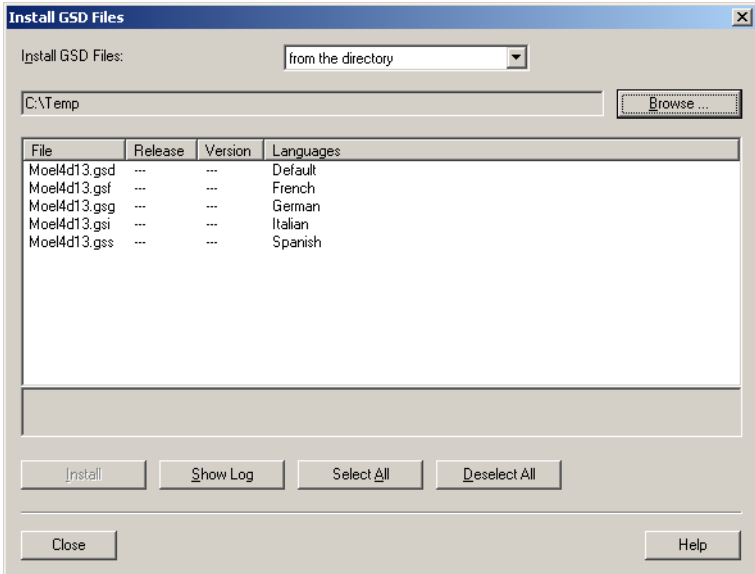


Figure 19: Installing the GSD file - Selection



If an older GSD file is already present, this is moved to the backup directory before the installation.

The SWD gateway is now available as a modular DP slave in the **Hardware Catalog** window, directory **PROFIBUS-DP-> Additional FIELD DEVICES -> switchgears** under **EU5C-SWD-DP (Mot)**.

Installing a project-specific GSD file

The "SWD-Assist" planning and ordering tool enables you to create a complete SWD network. It is also possible to create a project-specific STEP7-compatible GSD file with the software. SWD-Assist stores the GSD file under the name of the current project with the appropriate extension, such as SWD_Proj.gsd. This can be installed in STEP7 in the same way as the standard GSD file.



When naming the GSD file in SWD-Assist, ensure that it does not exceed 8 characters in length. Longer names are not recognized by the **HW Config** configurator.

- Install the project-specific GSD file via **Options -> Install GSD File...** as described above for the standard GSD file.
- Choose the GSD file created by SWD-Assist in the designated folder and click the **Install** button.

The SWD-Gateway is now available in the **Hardware Catalog** window, directory **PROFIBUS-DP-> Additional FIELD DEVICES -> switchgears** under **EU5C-SWD-DP (<SWD-Assist project name>)**.

The EU5C-SWD-DP gateway can now be added.

Configuration with the SWD gateway

The following configuration description applies both to installed standard GSD files and project-specific GSD files.

Requirement: The **HW Config** dialog window is opened.

Configuration with standard GSD file installed

Now add the SWD-Gateway with the component designation EU5C-SWD-DP and the standard suffix (Mot) to the existing PROFIBUS-DP configuration.

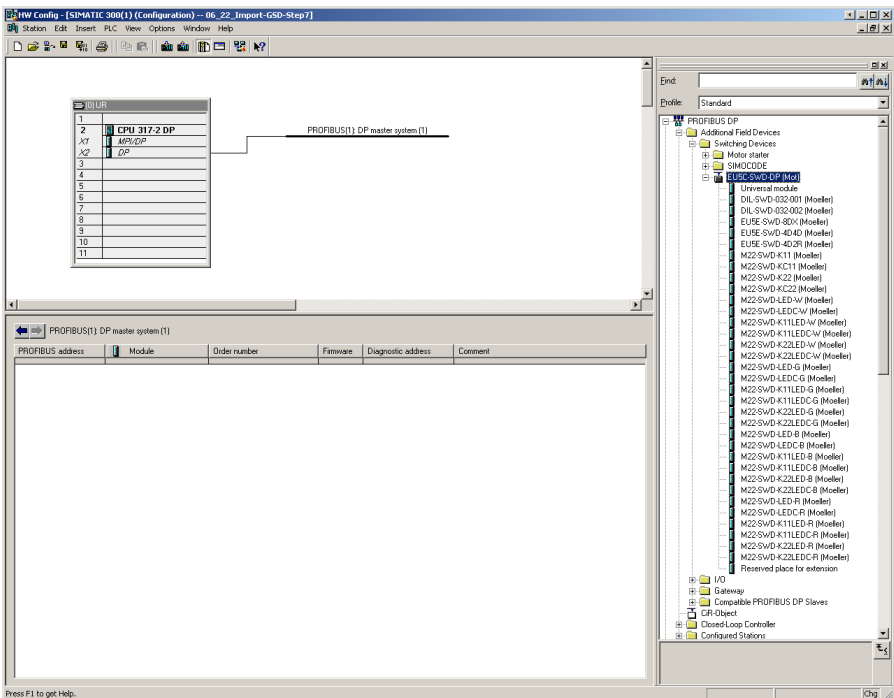


Figure 20: Configuration with standard GSD file installed

- Now add the SWD gateway with the component designation **EU5C-SWD-DP (Mot)** to the PROFIBUS line in the window for the station.

Configuration with project-specific GSD file installed

Add here the SWD gateway with the component designation EU5C-SWD-DP and the project suffix in the existing PROFIBUS-DP configuration. The project-specific suffix, (e.g. SWD_Proj.gsd), is set by SWD-Assist.

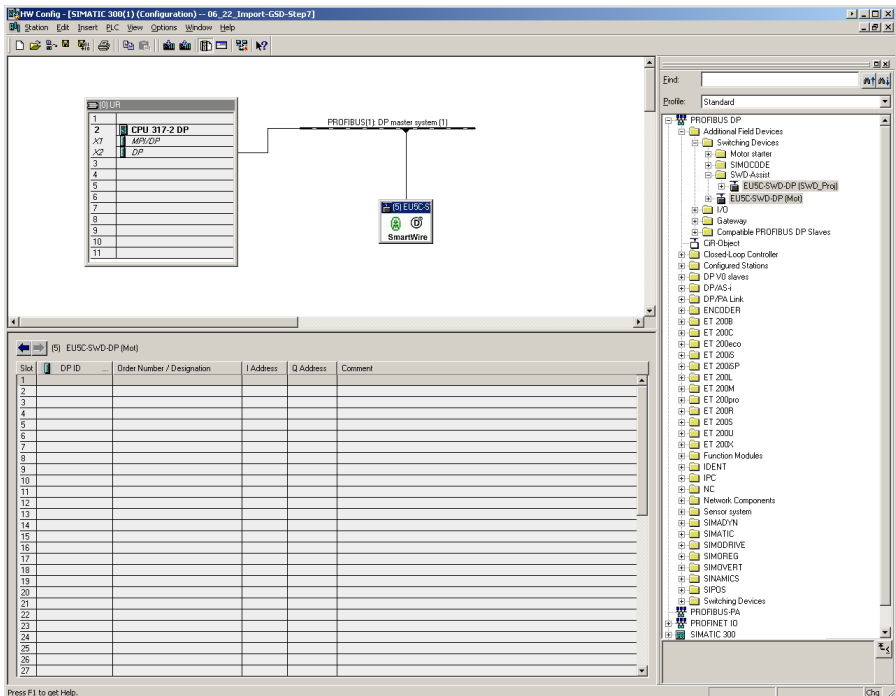


Figure 21: Configuration with project-specific GSD file installed

- Add the SWD gateway with the component designation **EU5C-SWD-DP** (<SWD-Assist project name>) to the PROFIBUS line in the station window.



After you have transferred this modular DP slave to your S7 project, all the SWD elements set in the SWD topology appear in the detail view of the station window.

Parameterization of the SWD gateway as DP slave

Requirement: The **HW Config** configurator is opened.

- ▶ When adding the SWD gateway set its DP properties, the station parameters and the DP slave address.



If possible, do not use the addresses 1 and 2, which can be used for other purposes, e.g. when operating multi-CPU's.

- ▶ In the station window, double-click the SWD gateway as a newly added DP slave.

In the dialog window that opens **Properties - DP slave** start the parameter setting in the **General** tab.

General tab

In this tab set the relevant parameters for the PROFIBUS-DP communication

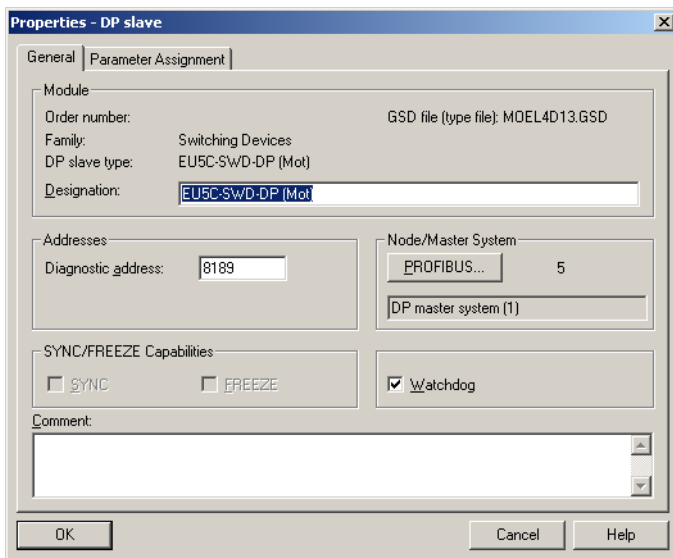


Figure 22: Setting the general properties of the DP slave (SWD gateway)

- If required activate the response monitoring.
- In the **Properties - DP slave** dialog, select the **Parameter Assignment** tab.

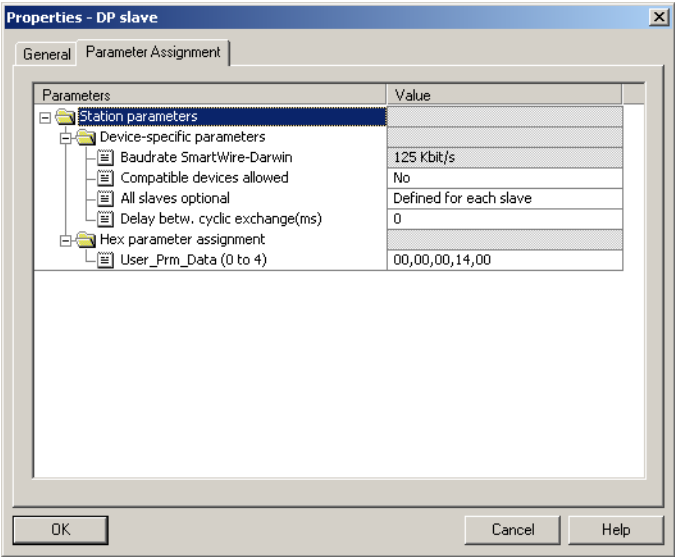


Figure 23: Station parameters of the SWD gateway

Parameter assignment tab

In this tab set the general settings of the SWD gateway and the SWD network under **Station parameters -> Device-specific parameters**. The figure shows the factory set parameters. The following table shows the parameters, their meaning and possible settings.

Table 6: ApplicationParameter

Parameters	Value	Meaning
SmartWire-Darwin baud rate	125 kBit/s (Default) 250 kBit/s (from operating system version 1.10)	The baud rate of the SWD network
Compatible Devices allowed (Compatible devices permissible)	No	The planned SWD slaves in the configuration must comply with the slaves of the stored gateway target configuration. If not, no data interchange takes place with the DP master.
	Yes	Data exchange takes place if the connected SWD slaves are compatible with the SWD slaves in the STEP7 DP configuration. This is indicated by the Status LED on the device.
All slaves optional (All devices are optional)	Defined for each slave (Define for each device)	Specification is performed individually for each slave (→ section "Parameters of individual SmartWire-Darwin slaves")
	Yes	Data transfer to the Profibus also takes place for a random number of failed SWD slaves. The individual setting in the module parameters has no effect.

Selecting the SWD slaves

Requirement: The SWD gateway must be present in the PROFIBUS-DP configuration.



This selection is unnecessary if you are using a project-specific GSD file created in SWD-Assist that already contains the required SWD slaves. The following description also applies if you wish to add additional SWD slaves in the **project-specific** PROFIBUS-DP configuration using the HW Config configurator.

- Move to the **Hardware Catalog** and click the plus sign in front of the standard SWD gateway EU5C-SWD-DP (Mot) under **PROFIBUS-DP -> Additional FIELD DEVICES -> switchgears**.

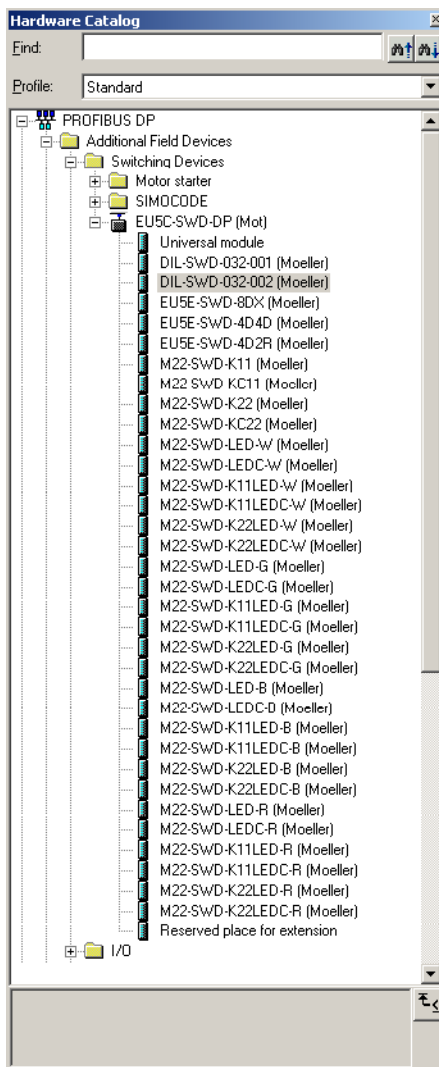


Figure 24: EU5C-SWD-DP (Mot) standard gateway with SWD slaves

You can then select in the **Hardware Catalog** the SWD slaves that you require on this SWD gateway.



Observe the correct order of the SWD slaves in the SWD network. The SWD slaves must be configured according to their arrangement in the installation.

► Double-click the required SWD slaves.

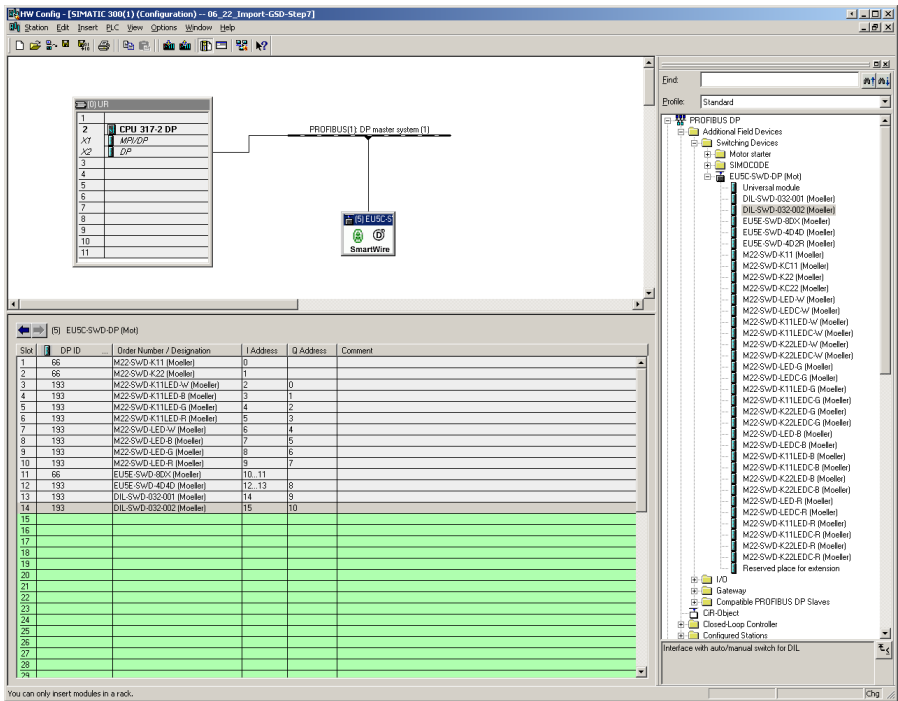


Figure 25: Selecting the SWD slaves on the EU5C-SWD-DP (Mot) gateway



Caution!
The universal module is not a valid SWD slave and must not be added to the project.

Parameterization of the input/output addresses of an SWD slave

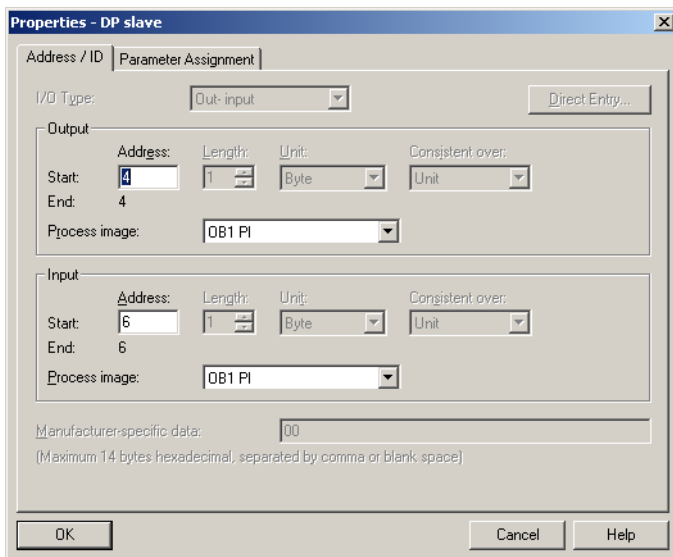


Figure 26: Input/output addresses of the SWD slaves

The address proposed by the system can be accepted directly. The preset address value ensures that the start address is within the process image of the inputs and outputs.

If required the I/O addresses can also double-clicked and modified later, providing the appropriate CPU is present.

The inputs and outputs are used as “normal” local inputs/outputs in the application program.



Please refer to the manual MN05006001Z-EN (previously AWB2723-1613en) for the exact configuration and meaning of the input and output data.

Setting specific parameters of SWD slaves

You can parameterize the startup behavior for each Smart-Wire-Darwin slave. This defines how the gateway is to respond if an SWD slave is not present. The standard setting is that all slaves have to be available.

However, the information as to whether a slave is available is also reported to the application via the diagnostics function so that you can implement here a specific response to the failure of an individual slave (→ section “Diagnostics” on page 63).

Changing settings

- To change the setting in the **HW Config** configurator select the required SWD slave and double-click this line.
- In the dialog window that opens **Properties - DP Slave** select the **Parameter assignment** tab.

Double-click the SWD slave to display the **Properties - DP Slave** dialog field.

In the **Device-specific parameters** folder, for example, you can change the option **Device shall be present** to **Device may not be present** (does not have to be present) in the **Value** column.

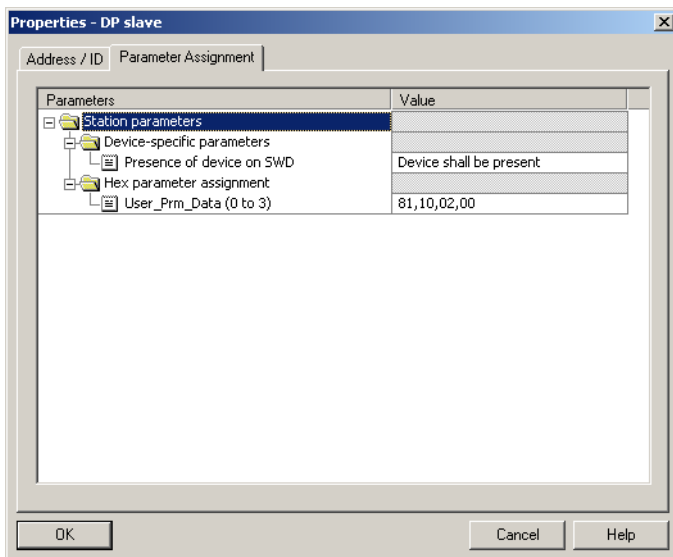


Figure 27: Specific parameter assignment of the SWD slaves



Parameter setting at this point only makes sense if the value Defined for each slave is set in the application parameters (see above) for the parameter All Slaves optional.

Later adding of SWD slaves

If you are not sure of the final SWD topology and may wish to add SWD slaves at a later time, adding a placeholder (dummy module) in the appropriate position in the SWD network is recommended. This is also useful in STEP 7 since the HW Config tool does not allow the adding of stations between occupied module locations.

- Position the permanent SWD slaves in the correct order and add the placeholder (reserved place for expansion) at the required position.

A wildcard reserves a station address for SWD network station to be added later.

- Save the project and then transfer it to the PLC. Switch the PLC to RUN mode.

After the DP configuration is received from the PLC, the SWD gateway addresses the slaves automatically taking the placeholder into account.

Acyclical data communication

SmartWire-Darwin slaves such as the PKE-SWD-32 module for the electronic motor protective circuit breaker also supply acyclical data in addition to the cyclical data. The function blocks SFB52 RDREC (read record) and SFB53 WRREC (write record) are used in STEP7 for reading and writing acyclical data.

The reference to the required slave is implemented with these function blocks via the parameters ID and Index.

The input address of the SmartWire-Darwin slave with which communication is to be established is set at the parameter ID. The Index parameter addresses the V1 object. The first object is assigned number 1, the second 2 etc. On the SmartWire-Darwin slave PKE-SWD-32, the object 1 supplies the current value I_{rel} .



Refer to the STEP 7 documentation for further information on handling these function blocks.

Diagnostics

The system SmartWire-Darwin provides you with cyclic and acyclic diagnostic information.



Please refer to the documentation of the PROFIBUS-DP master XIOCN-ET-DP-M in the manual MN05002002Z-EN (previously AWB2725-1452en) for basic information on the DP diagnostics. You will find explanations there on access to the diagnostic data of a DP slave station



When using a Simatic S7, different system modules may be used to evaluate the slave diagnostic function. For this refer to the relevant documentation of the CPU or CP used.

Cyclic diagnostic information

This basic diagnostic information is coded in the normal I/O map of each SWD slave. They provide information about whether the slave participates in the normal data interchange via the SWD network. Furthermore, it is reported whether any current diagnostic messages are pending. These two information items are located in the first input byte in bit positions 4 and 6 for all SWD slaves. They permit fast and easy assessment of the condition of the SmartWire-Darwin slave.

- The SWD slave is present and integrated actively into the SWD network.
- The SWD slave is operating fault-free.

Example

M22-SmartWire-Darwin-K11-LED-R function element with one byte input (switch position indicator and diagnostic information)

Byte 0:

7	6	5	4	3	2	1	0
Diagnostic data				Input data			
-	P	-	F	-	-	NC1	NC1

Bit	Designation	Meaning
0	NC1 = Normally Closed	0: contact actuated 1: Contact not actuated
1	NO = Normally Open	0: Contact not actuated 1: contact actuated
2	not used	-
3	not used	-
4	F = Failure	0: No diagnostic alarm 1: diagnosis present
5	not used	-
6	P = Module present	0: module not present 1: module present
7	not used	-

Outputs:

Byte 0:

7	6	5	4	3	2	1	0
-	-	-	-	-	-	-	Q0

Bit	Designation	Meaning
0	Q0	Actuation LED
1	not used	-
2	not used	-
3	not used	-
4	not used	-
5	not used	-
6	not used	-
7	not used	-

If the evaluation of the diagnostic bit shows that there is extended diagnostic information, details on this can be determined by evaluation of the acyclic diagnostics of the PROFIBUS-DP.

In the case of the SWD slave considered here the following detailed conditions could be determined.

Value	Meaning
0x10	The contact is longer than four seconds in the middle position.
0x11	There is a short-circuit in the contact.

Acyclic diagnostics

As could already be seen in the configuration, the SWD coupling unit with its slaves appears as a modular DP slave. This also applies to the structure of the diagnostic data. PROFIBUS-DP defines for modular slaves a standard access process for diagnostic information. The diagnostics consist of standard diagnostics header (DP-V0 header), of a likewise standardized module status and of optionally extended diagnostic messages in the attachment from one or several slaves that report detailed diagnostics. The terms used in the standard PROFIBUS are used in the following. The designation “module” is synonymous with a SWD slave.

Diagnostic data	Description
DP-V0 header (6 byte)	Standard diagnosis header
Module status (standard)	Standard module status
first extended diagnostic message (optional)	device-specific detailed messages
...	
last extended diagnostic message (optional)	

Standard diagnosis header

DP-V0 header structure

Byte	Value	Explanation
1		V0 Status-1
2		V0-Status-2
3		V0-Status 3
4		DP master address
5	0x4d	Eaton device identification
6	0x13	Eaton device identification

Device-specific diagnostics

The device-specific diagnosis consists of the module status block, which provides general information about the module (SWD slave) as well as, if necessary, extended information from SWD slaves that are reporting diagnoses.

The module status block complies with the standard requirement of the diagnosis of a modular DP slave from the structure standpoint.

Structure of the module status block

Byte	Value	Description
Module status header		
1	Lx	Length of the slave status block
2	0x82	
3	0x00	
4	0x00	
Module status		
5		Two status bits for SWD slaves 1 - 4
...		Two status bits for SWD slaves 5 - 8
Lx		Two status bits for other SWD slaves

In the first byte the module status block contains the length of the complete module status block, followed by the codes 0x82, 0x00, 0x00. It is therefore compatible with the format for the status of DP-V1.

As of the fifth byte two bit status codes per module (SWD slave) follow. So the status of up to four SWD slaves is packed into a byte. Non-used bits are filled out with 0 in the last byte.

2-bit status code	Explanation
00	A cyclic data interchange is performed with the respective SWD slave.
01	A diagnostic message from the SWD slave is pending.
10	Configuration error (incompatible SWD slave)
11	Failure of a SWD slave

Extended diagnosis (module related)

The extended diagnostics contain the slave address of the SWD slave, status information and one or several detailed specifications relating to error or diagnostic causes.

You can find the meaning of the specifications in the manual MN05006001Z-EN (previously AWB2723-1613en).

Table 7: Structure of the extended diagnosis

Byte	Value	Description
1	Ly	Length of detailed status message
2	0xA1	Status type
3		SWD station address (1 - 58)
4	0	-
5		first detailed diagnostic message/status message
6		-
Ly		nth detailed diagnostic message/status message

Example

A SmartWire-Darwin network consists of nine SWD slaves. If a short-circuit is reported in a SWD slave EU5E-SWD-4D4D (input/output module with overload message) that is the fifth slave in the SWD network, the diagnostics look as follows.

Absolute byte	Byte	Value	Description
1	1	0x8	V0-Status-1
2	2	0xC	V0-Status-2
3	3	0	V0-Status 3
4	4	1	DP master address
5	5	0x4D	Gateway ID
6	6	0x13	Gateway ID

Module status header

7	1	0xC	Length of module status
8	2	0x82	-
9	3	0x00	-
10	4	0x00	-
11	5	0x0	The SWD slaves 1 to 4 do not report a diagnosis.
12	6	0x01	The SWD slave 5 reports a diagnosis.
13	7	0x0	The SWD slave 9 does not report a diagnosis.

Extended diagnostics E/A module

14	1	5	Length of detailed status message
15	2	0xA1	Status type
16	3	0x5	SWD slave address
17	4	0	-
18	5	0x13	Message: short-circuit/overload

5 CANOpen gateway EU5C-SWD-CAN

Introduction

The SmartWire-Darwin gateway EU5C-SWD-CAN creates a connection between the SmartWire-Darwin slaves and an overriding CANopen master.

Surface mounting

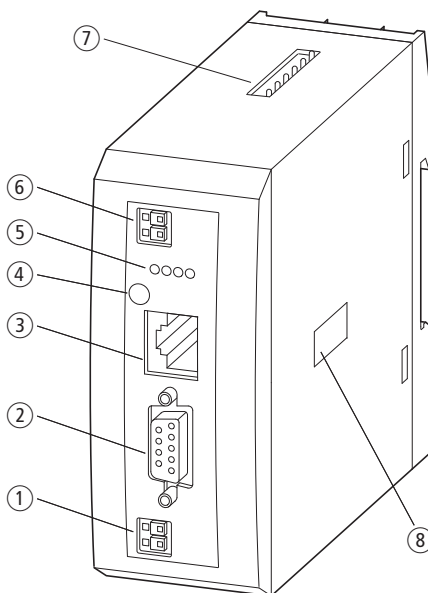


Figure 28: Front view EU5C-SWD-CAN

- ① 24-V power supply POW
- ② Field bus interface
- ③ Diagnostics interface
- ④ Configuration button
- ⑤ Diagnostics displays
- ⑥ 24-V power supply AUX
- ⑦ Connection SmartWire-Darwin
- ⑧ Address switches

The gateway creates a connection between the slaves on the SmartWire-Darwin network and the overriding PLC. Furthermore, it provides two power supplies, one for the SmartWire-Darwin slaves and a 24 power supply for the contactor coils, in case this is also operated via a SmartWire-Darwin slave. The power supply and the data communication are conducted via the 8-pole SmartWire-Darwin cable from the coupling unit to the slaves.

Engineering

In connection with the SmartWire-Darwin slaves the coupling unit appears as a modular slave according to profile DS301.4 on the field bus CANOpen. Each SmartWire-Darwin slave is a module of its own. Up to 99 SmartWire-Darwin slaves can be operated via a CANOpen gateway. However, take heed of the maximum data volume that can be exchanged via CANOpen. The maximum for a Profibus slave is 128 bytes of input data and 128 bytes of output data.



Information about the volume of input/output data of an SWD slave is provided in the Appendix of the manual MN05006001Z-EN (previously AWB2723-1613) "Smart-Wire-Darwin Slaves".

The SmartWire-Darwin network may be extended up to 600 m.

Connection

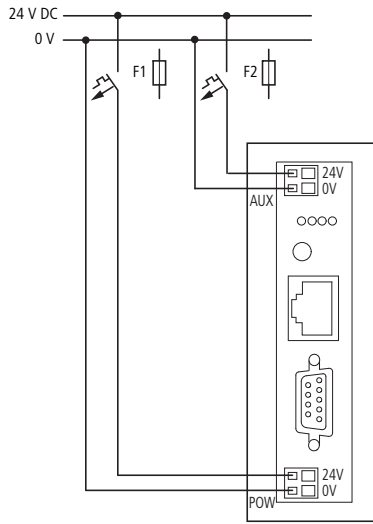


Figure 29: Connection

Power supply of the coupling unit and supply of the SmartWire-Darwin slave electronics are performed via the terminals POW. The coupling unit contains an additional power supply unit for the 15 V supply of the SmartWire-Darwin slaves with an amperage of 0.7 A.

- On the SWD gateway connect the POW and AUX supply voltages via separate miniature circuit-breakers or fuses:
 - Miniature circuit-breaker 24 V DC for **POW**
 - Cable protection in accordance with **DIN VDE 0641** Part 11, IEC/EN 60898:
 - Miniature circuit-breaker 24 V DC rated operational current 3 A; trip types **C** or
 - Fuse 3 A, utilization class gL/gG
 - Cable protection for cable AWG 24 in accordance with **UL 508** and CSA-22.2 no. 14:

- Miniature circuit-breaker 24 V DC rated operational current 3 A;
tripping characteristics C or
- Fuse 3 A
- Miniature circuit-breaker 24 V DC for **AUX**
 - Cable protection in accordance with DIN VDE 0641 Part 11, IEC/EN 60898:
 - Miniature circuit-breaker 24 V DC rated operational current 3 A;
trip type **Z** or
 - Fuse 3 A, utilization class gL/gG
 - Cable protection for cable AWG 24 in accordance with UL **508** and CSA-22.2 no. 14:
 - Miniature circuit-breaker 24 V DC rated operational current 2 A;
tripping characteristics **Z** or
 - Fuse 2 A



Please take into consideration the total power consumption of your SmartWire-Darwin network and, if necessary, plan for an additional feeder module EU5C-SWD-PF2.

You will find information on the current consumption in the document MN05006001Z-EN (previously AWB2723-1613en).



If any switching devices are also connected via the SmartWire-Darwin slaves DIL SmartWire-Darwin -32-001/002, the AUX supply will also be required. This provides the supply for activating the contactor coils. This supply must be fused by an miniature circuit-breaker (3 A gG/gI or 3 A miniature circuit-breaker with a Z characteristic).

If switching devices with an activation power greater than 3 A are connected, an additional feeder module EU5C-SWD-PF1 or EU5C-SWD-PF2 must be used.



In the planning of the SmartWire-Darwin network you are also supported by the software program SWD-Assist, which automatically indicates the need for any necessary new feeder modules.

CANopen address setting

The coupling unit requires a unique address (node ID) in the CANopen network. This is set on the gateway via DIP switches (switches 3 - 8). Valid addresses are 1 - 32.

CANopen connection

Connection to the field bus is performed via a 9-pole D-SUB socket.

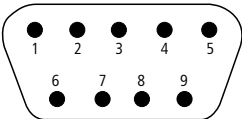
	SUB-D plug	Signal
	1	-
	2	CAN_L
	3	GND
	4	-
	5	-
	6	GND
	7	CAN_H
	8	-
	9	-

Figure 30: Configuration of the CANopen plug on the coupling unit

Baud rate

The gateway supports operation on CANopen masters at up to 1 MB. Adaptation to the baud rate of the network master takes place automatically.

Programming system

For selection of the device and operation via the field bus CANopen an EDS description file (EDS = electronic data sheet) is used. The EDS file contains standardized descriptions of the CANopen slaves.

For the CANopen gateway EU5C-SWD-CAN this is the file EU5C-SWD-CAN.eds.

The further development of the SmartWire-Darwin communication system has resulted in different versions of the EDS files. The relationship between supported SWD slaves and EDS files is provided in the EU5C-SWD-CAN version table in the Appendix on page 136.



As of version V.2.3.9 and service pack ecp_update_0109 this file is included in the Eaton programming system easySoft-CoDeSys. You can also find these files on our web site as follows:

<http://www.moeller.net/de/support/index.jsp>

Please follow the links provided there.

Diagnostics interface

The gateways have an online diagnostics interface with the following functions:

- Update of the operating system of the SWD gateways
- Connection of the SWD-Assist for the online diagnostics of the SWD network

The EU4A-RJ45-CAB1 programming cable (serial SUB-D<->RJ45) or the EU4A-RJ45-USB-CAB1 USB cable (USB<->RJ45) can be used for the connection.

The online functions of the SWD-Assist software offer a wide range of options for the display and the diagnostics functions of the SWD network even without the active PLC.

- Status indication of the inputs/outputs
- Wiring test
- Reading of the stored actual configuration
- Reading the SWD configuration
- Comparison of the target and actual configuration
- Display of cyclical and acyclical diagnostics messages

Further details are described in the online Help of the SWD-Assist software.



These online functions are available from operating system version 1.10 of the gateways and version 1.10 of the SWD-Assist software.

6 Installation EU5C-SWD-CAN

Mounting

Please proceed as follows to install the device:

- First of all set the CANopen address (node address). This is set on the gateway via DIP switches (switches 3-8). The DIP switches are located under a cover on the right-hand side of the gateway. Valid addresses are 1 - 32.

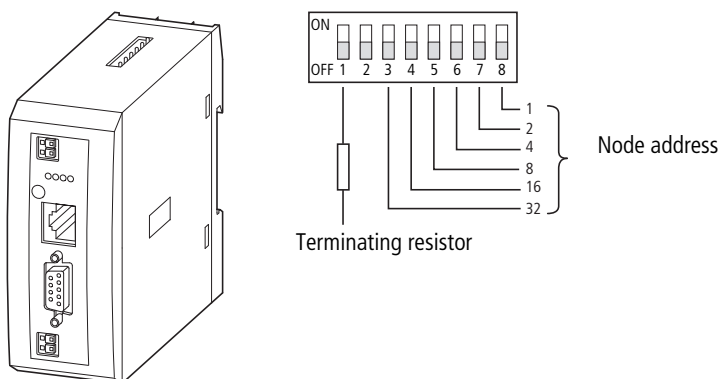


Figure 31: Setting the slave address

- Mount the device on the DIN rail.

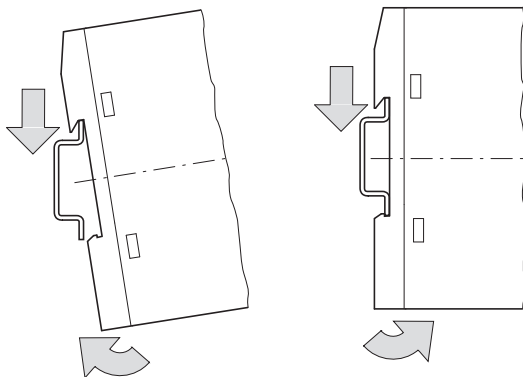


Figure 32: Mounting on DIN rail

- Connect the 24 V DC voltage to the terminals POW on the front side of the gateway.
- If necessary, connect the 24 V DC voltage for the contactor coils to the terminals AUX.

**Warning!**

In safety-related applications the power supply unit that supplies the SmartWire-Darwin system must be executed as a PELV power supply unit (protective extra low voltage).

**Caution!**

You must take safety precautions (emergency switching off) in the external circuitry of the EU5C-SWD-DP and any power modules type EU5C-SWD-PF1-1 or EU5C-SWD-PF2-1 that are used. To do so, plan to switch off the power supply to the contactor coils AUX.

**Warning!**

Switch off the power supply, if you are reconnecting slaves in the SmartWire-Darwin system or reconnecting the ribbon cable connection. Otherwise the SmartWire-Darwin slaves could be destroyed!

Potential conditions between the components

The entire SmartWire-Darwin system operates on a common supply voltage. Provide a common star point for the earth wiring. In this way the various stations in the SmartWire-Darwin system will not be electrically isolated from one another. The field bus and the SmartWire-Darwin system are electrically isolated from one another.



Warning!

The gateway has protection against polarity reversal for the 24-V-DC-POW supply. However, if the gateway is connected via the serial interface to an earthed device (for example to a PC), the gateway can be destroyed, if the polarity of the power supply is reversed!

Connection SmartWire-Darwin

- Connect the SmartWire-Darwin network. To do so use the SmartWire-Darwin cable SWD4-100LF8-24 and the relevant SWD4-8MF2 spade connector or prefabricated cables of type SWD4-3F8-24-2S.

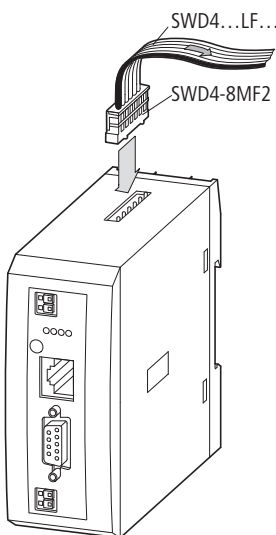


Figure 33: Connection SmartWire-Darwin

Connection CANopen

For connection to the CANopen cable you require a 9-pole SUB-D socket. (e.g. PS416-ZBS-411).

- Connect the CANopen cable by means of the CANopen plug to the field bus interface of the gateway.

The first and last slave in a CANopen network must terminate the field bus with a terminating resistor. The bus termination resistor is connected externally. In the case of gateway EU5C-SWD-CAN the terminating resistor can be activated by means of DIP switch 1.

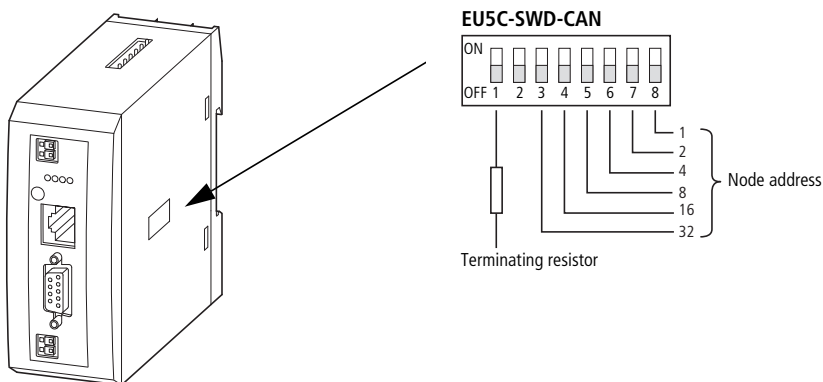


Figure 34: Activation of the terminating resistor

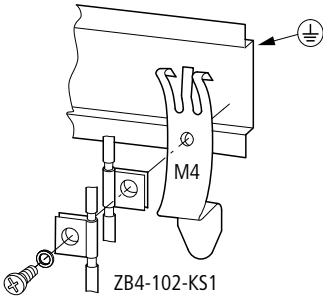
EMC-conformant wiring of the network

Undesired faults can occur on the field bus due to electromagnetic interference. This can be minimized beforehand by the implementation of suitable EMC measures. These include:

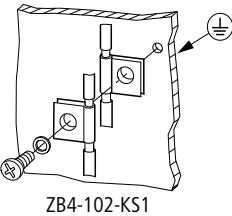
- EMC-conformant system configuration,
- EMC-compliant cable routing,
- Measures that do not allow the occurrence of large differences in potential und
- Correct installation of the CANopen network (cable, connection of the bus connectors, etc.)

The electromagnetic interference can be significantly reduced by the use of a cable screen (shield). The following illustrations indicate the correct method for connecting the shield.

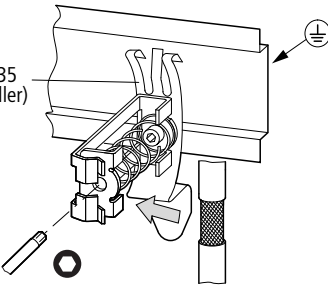
for DIN rail



for mounting plate



FM 4/TS 35
(Weidmüller)



KLbÜ 3-8 SC
(Weidmüller)

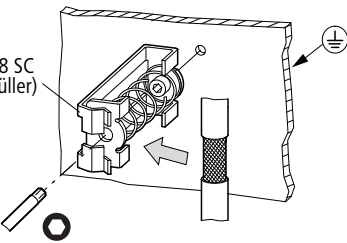


Figure 35: Shielding of network cable

7 EU5C-SWD-CAN Commissioning

Before switching on, check whether the power supply for the gateway is connected correctly . The configuration and installation of the Smart Wire Darwin network must also have been carried out correctly (with all slaves connected). If you have already integrated devices into a system, secure the operating range of any connected parts of the system against access so that nobody is endangered, for example, by motors starting up unexpectedly. Commissioning takes place in several steps:

- Put the SmartWire-Darwin network into operation.
- Create a connection to the field bus.
- Load and start the PLC program.

Putting the SmartWire-Darwin network into operation

Before the gateway can exchange data with the PLC, a valid SmartWire-Darwin network configuration (a so-called gateway target configuration) has to be stored in the gateway. This is compared with the current configuration (actual configuration) each time the gateway is restarted. If the gateway ascertains in this process that a SmartWire-Darwin slave cannot be reached or a wrong slave type is determined, the SmartWire-Darwin network will not go into operation (to be precise this is dependent on the network configuration). Reading of the SmartWire-Darwin network configuration takes place by pressing the configuration button on the gateway. All SmartWire-Darwin slaves are re-addressed in ascending order in the process.

This process may only take place in the case of

- initial commissioning,
- the replacement of a defective slave or
- a change to the configuration.

**Warning!**

If a SmartWire-Darwin slave has failed, the SmartWire-Darwin network can still be operated with the remaining slaves, depending on the configuration setting (even after a repeat power up of the gateway). The failure is reported to the application. If there is a faulty configuration and the configuration button is pressed, only the slaves up to the failed device are addressed and stored. Use of the remaining slaves is not possible until the defective slave has been replaced and the configuration has been read in again by pressing the configuration button.

Switching on for initial startup, a replacement or a changed SmartWire-Darwin configuration

Prerequisite for reading the configuration:

- All SmartWire-Darwin slaves are connected to the SmartWire-Darwin line.
 - The SmartWire-Darwin network is connected to the gateway.
 - Voltage POW is applied to the gateway and the power LED lights up.
 - The voltage AUX is applied (if necessary).
 - The SmartWire-Darwin status LEDs of the SmartWire-Darwin slaves are on or are flashing.
 - If necessary remove the CANopen fieldbus terminal from the SWD gateway.
- Press the configuration button on the gateway for at least two seconds. The SmartWire-Darwin status LED on the gateway begins to flash orange. The SmartWire-Darwin status LEDs on the SmartWire-Darwin slaves also flash. All slaves are addressed in sequence, the complete configuration is stored retentively (coupling unit target configuration). The coupling unit is then restarted (see next section).

Switching on when the gateway target configuration is stored

If a configuration is stored in the gateway, each time the supply voltage is switched on it is checked whether the slaves actually found on the network comply with the stored gateway target configuration. The result of the check is displayed via the SmartWire-Darwin status LED on the gateway:

Description	SmartWire-Darwin status LED	Data interchange between the gateway and SmartWire-Darwin slaves
The current actual configuration complies with the gateway target configuration.	Green continuous light	Yes
A necessary SWD slave is missing or the coupling unit target configuration does not comply with the actual configuration.	Flashing (red)	no
Slave addressing is active (after power on or the download of a planned configuration with empty modules).	Flashing (green)	no
Short-circuit on the 15 V power supply or no SmartWire-Darwin slave is connected.	Red continuous light	no

Creating field bus communication

If a data interchange is possible between the SmartWire-Darwin slaves and the gateway, in principle communication between the gateway and the controller can also be performed via CANopen.

- Connect the CANopen gateway to the field bus.
- Load the program into the PLC.

The configuration of the CANopen network is transferred to the CANopen master when the program is uploaded onto the controller. The CANopen master then transfers the configuration of the SmartWire-Darwin network to the gateway and tests it. (This only applies if you have checked

Create SDOs for module list in the PLC configuration.) All status LEDs will be green if the configuration set matches the stored gateway configuration.

Any errors that occur are indicated via the CANopen status LED and the Config status LED.

Table 8: CAN-Status-LED

Description	CAN status LED	Data exchange gateway via the CANopen to PLC
CAN interface inactive.	off	no
Baud rate detection active on the CAN bus	Red strobe light	no
CAN baud rate detected ,waiting for a valid target configuration	Orange	no
Communication error on the CAN bus. (error warning level reached.)	Red flashing	Yes
Monitoring error (node guarding/heart-beat.)	flickering red strobe light	only SDO
Communication error on the CAN bus (bus Off.)	Red	no
Pre-operational initialization mode - communication only possible via SDOs	Green flashing	only SDO
Stopped - no data exchange	Green strobe light	no
Operational - data exchange is possible via PDOs and SDOs	Green	Yes

So the prerequisite for data interchange is that the configuration drawn up on the PLC system (= planned configuration) complies with the configuration actually available on the gateway. The result of this check is signalled on the gateway via the SmartWire-Darwin configuration LED.

Table 9: Signals of the SmartWire-Darwin configuration LED

Description	SmartWire-Darwin configurations LED	Data exchange gateway via the CANopen to PLC
The planned configuration complies with the gateway target configuration.	Green continuous light	Yes
The planned configuration does not comply with the gateway target configuration, but is compatible with it. (list of the devices that are compatible with one another → Table 15, page 127)	Flashing (green)	Yes
The planned configuration and the gateway target configuration are not compatible.	Red continuous light	no

If all status displays indicate a green continuous light, commissioning has been completed successfully.

8 Programming the EU5C-SWD-CAN

Introduction

An EDS description file (EDS = Electronic Data Sheet) is used for integration of the gateway and operation via the field bus CANopen. The EDS file contains standardized descriptions of the CANopen slaves. For the CANopen gateway EU5C-SWD-CAN this is for example the file EU5C-SWD-CAN.eds.



The name of the EDS file depends on the version.

The relationship between supported SWD slaves and EDS file is provided in the EU5C-SWD-CAN version table on page 136 in the Appendix.



As of version V.2.3.9 and service pack ecp_update_0109 this EDS file is included in the Eaton programming system easySoft-CoDeSys.

You can also find these files on our web site as follows:

<http://www.moeller.net/de/support/index.jsp>

Please follow the links provided there.

Now please download the EDS file to the corresponding directory of your programming system.

Please refer to the documentation of your programming system for information on this.

For the Eaton programming system easySoft-CoDeSys this folder is in:

C:\Program files\Common files\CAA-Targets\
<Version>\PLCCConf

The installed version for this is, for example,
Moeller V2.3.9.

Configuration and parameterization with easySoft-CoDeSys

The connection of a SmartWire-Darwin network via the gateway EU5C-SWD-CAN to the controller XC200 is described in this section. Please check beforehand whether you have a current easySoft-CoDeSys version installed with the necessary EDS file.

Then please proceed as follows:

- ▶ Start easySoft-CoDeSys and open a project.
- ▶ Open the controller configuration and activate the CANopen master function of the CPU.



Use of the CANopen master function presumes integration of the library 3S_CANopenMaster.lib.

3S_CANopenMaster.lib is inserted into **Ressources/ Library manager**.

After adding the file 3S_CANopenMaster.lib the additionally required libraries 3S_CANopenManager.lib and 3S_CanDrv.lib are also automatically loaded.

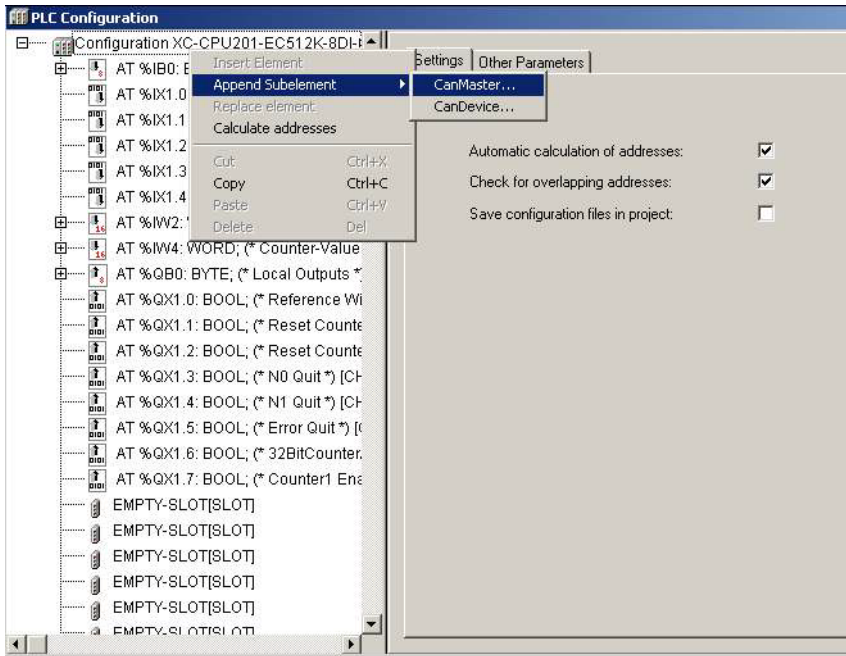


Figure 36: Select the CAN master

- ▶ Mark the CAN master and via the menu option **Insert -> Append Subelement** or the context menu open the selection list of the CANopen slave modules. Select the gateway EU5C-SDW-CAN.

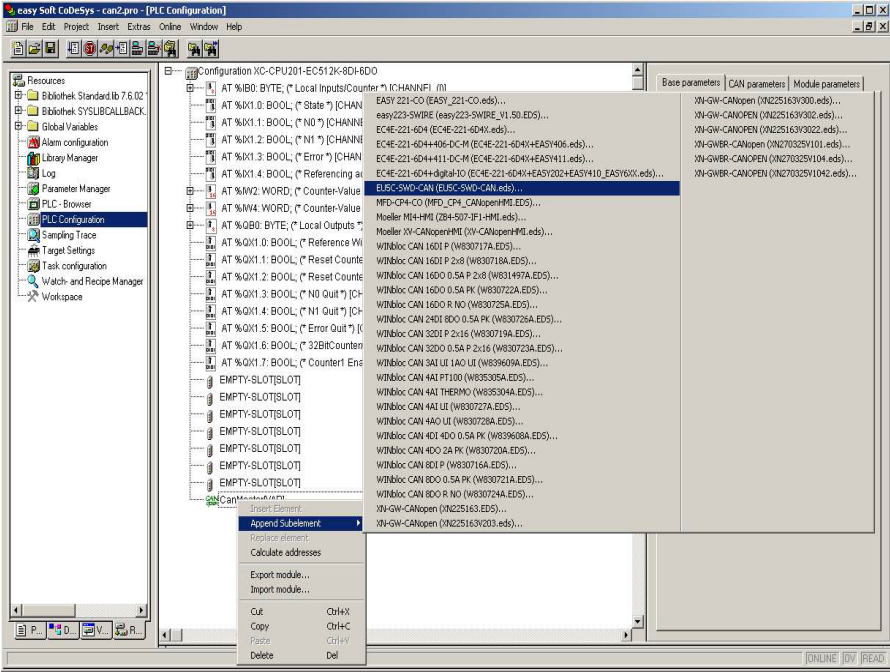


Figure 37: Selection of the gateways

Selecting the SmartWire-Darwin slave

- ▶ Change over to the **CAN Module Selection** tab.
- ▶ Now select here the SmartWire-Darwin slaves that you require for your SmartWire-Darwin network. Please heed of the correct sequence. The modules must be configured just as they will be arranged afterwards in your application.

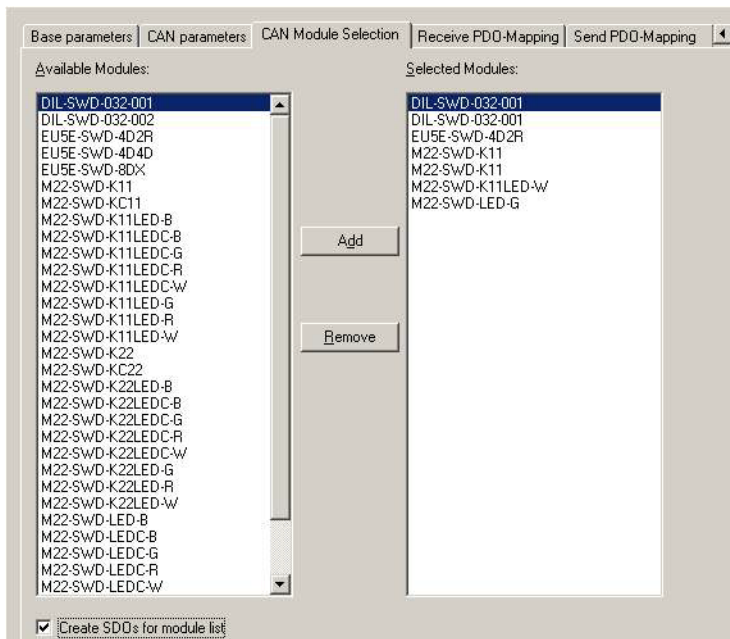


Figure 38: Selection of the slaves

For downloading the configuration please select the box **Create SDOs for module list**. In this way the target configuration stored in the gateway can be compared with the one drawn up here in the programming system. If this box is not selected, you must set the parameter "Disable configuration check" in the **Service data objects** tab to True (= 1).

Parameter setting

Parameters for communication of the gateway with the CANopen master and with the SmartWire-Darwin network are also defined in the controller configuration.

These are the meanings of the individual tabs.

“Base parameters” tab

Here you can define the I/O start addresses for the mapping of the SmartWire-Darwin slaves onto the inputs/outputs of the controller map. As standard the programming system creates a complete connection to the I/Os up to now. You can, however, change these values to other, unassigned areas.

“CAN parameters” tab

The parameters that relate to communication with the field bus CANopen are entered under these settings. These include, for example, the slave address (node ID) or the monitoring time (watchdog control).



Only the addresses 1 to 32 may be assigned for the gateway. The gateway requires for communication four times the number of PDOs than it does for a standard CANopen slave.

Ensure that the COB-IDs of the activated PDOs do not collide with the other CANopen slaves in the same network. The addresses of the individual PDOs are derived as follows:

PDO 1 - 4: address = NodeID + standard offset

PDO 5 - 8: address = NodeID + standard offset + 64

PDO 9 - 12: address = NodeID + standard offset + 96

PDO 13 - 16: address = NodeID + standard offset + 32

In the case of slaves with higher addresses than 32 it must be ensured that no collisions occur on account of overlapping default PDO mappings. In this case the mapping must be checked and, if necessary, adapted.

Guarding mechanisms

Node guarding or heartbeat can be used to monitor communication between the gateway and the CAN master.

- Node guarding

In node guarding the CAN master uses cyclical protocols to monitor the CAN slaves.

For this the CAN master sends within the set cycle time a frame for which the CAN slaves send an appropriate response. If a slave does not respond, the CAN master repeats this operation. The CAN slave is considered as non-existent if the number of repeat attempts exceeds the set value. The monitoring interval (Guard Time) and the number of repetition attempts can be set as required. Node guarding is deactivated by default.

- Heartbeat

If the **Activate heartbeat generation** option is checked, the module emits heartbeats at the millisecond interval specified in **Heartbeat producer time**. The heartbeat function is deactivated if the entered value is 0.

Unlike in node guarding mode, the CAN slaves and the CAN master each send in heartbeat mode a frame for monitoring communication. It is also possible to create dependencies in the communication processes between the CAN slaves.



The node guarding mechanism cannot be operated together with the heartbeat monitoring.

The following figure shows the tab with the CAN parameters.

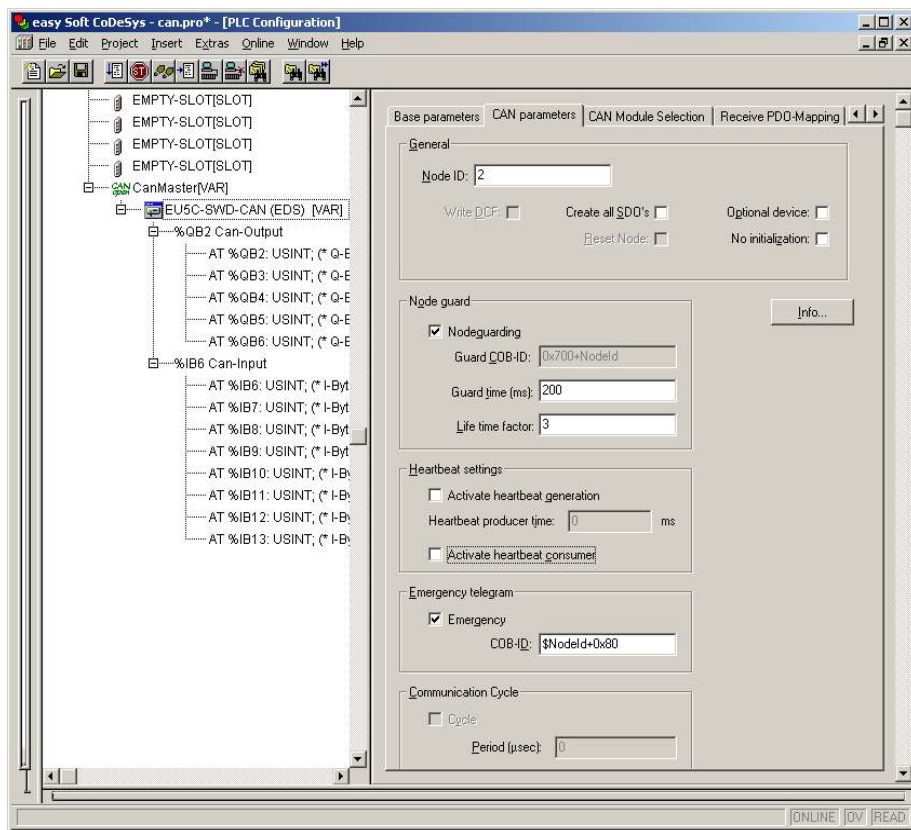


Figure 39: Setting the CAN parameters

“Service Data Objects” tab

In the **Service data objects** tab you can make parameter settings both for the SmartWire-Darwin network and for individual slaves.

Parameters for the SmartWire-Darwin network

Index	Name	Value	Type	Default
2000	Baudrate SmartWire Darwin (0-7)	4	Unsig...	4
2001	Compatible devices allowed (1=Yes, 0=No)	0	Unsig...	0
2002	All slaves optional (1= Yes, 0 = No)	0	Unsig...	0
2003	Disable configuration check (1=Yes, 0 = No)	0	Unsig...	0
2010	Delay betw. cyclic exchange(0-255ms)	0	Unsig...	0

Table 10: Parameters for the SmartWire-Darwin network

Parameters	Value	Meaning
Baud rate SmartWire- Darwin (0 - 7)	4	The baud rate of the SmartWire-Darwin network Setting options: • 4 = 125 kBit/s (Default) • 5 = 250 kBit/s (from operating system V1.10)
Compatible devices allowed (1 = Yes, 0 = No)	0	The planned slaves in the CANopen configuration must comply with the slaves of the stored gateway target configuration. If not, no data interchange takes place with the CAN master.
	1	Data interchange also takes place, if the SWD slaves are not identical to the CANopen configuration, but are compatible with each other. This is displayed via the status LED on the device. (you will find the list of devices that are compatible with one another in Table 15, page 127).
All Slaves optional (1 = Yes, 0 = No)	0	A data transfer to the CANopen master takes place only if all SWD slaves for which the parameter "Device presence" = 1 (obligatory slave) is set are actually present in the network. Specification is performed individually for each slave.
	1	A data transfer to CANopen also takes place, if there are a random number of failed SWD slaves. The setting in the module parameters has no effect.
Disable configuration check (1 = Yes, 0 = No)	0	A check is performed between the planned and stored target configuration. If not equal, no data interchange takes place.
	1	No check is performed between the planned and stored target configuration. This setting is performed for all configurators outside of easySoft-CoDeSys, because only easySoft-CoDeSys supports the downloading of a CAN configuration to the CANopen gateway.
Delay between cyclic data exchange (0 - 255ms)	0	At present the value cannot be changed.

Changing settings

Select the field and change the setting to the desired value.

Parameters of individual SmartWire-Darwin slaves

Once you have selected SmartWire slaves new parameters are added to the service data objects. Thus, for example, specification of the transient behavior can be performed individually. If certain slaves are 'mandatory for operation, you can specify that the complete SmartWire-Darwin network will not go into operation, if one of these necessary slaves is missing.

To find the parameters more easily the name of the slave and the position of the SWD slave in the SmartWire-Darwin network are always appended to the actual settings (0 = first slave, 1 = second slave etc.).

The following settings are possible:

Parameter name	Value (default)	Meaning
Device presence (0 = optional; 1 = mandatory)	(1)	The SmartWire-Darwin slave must be present at the start or in operation. If it is not addressable, the entire SmartWire-Darwin network is stopped. Note: This is only effective, if the parameter "All slaves optional" in the general SWD network settings has the value 0.
	0	The SmartWire-Darwin slave may be missing at the start or in operation. Absence of the slave is reported to the application. Communication with the other slaves in the network remains unchanged.
Q_byte...	0 - 255 (0)	The initial value of the outputs that is output when the master starts, before the first data are sent by the PLC to the slave.

Input/output addresses

The selection of the SmartWire-Darwin slaves in the PLC configurator automatically causes the input/output addresses of the slaves to be assigned. The assignment of the addresses to the individual SmartWire-Darwin slaves can be viewed in the PLC configuration.

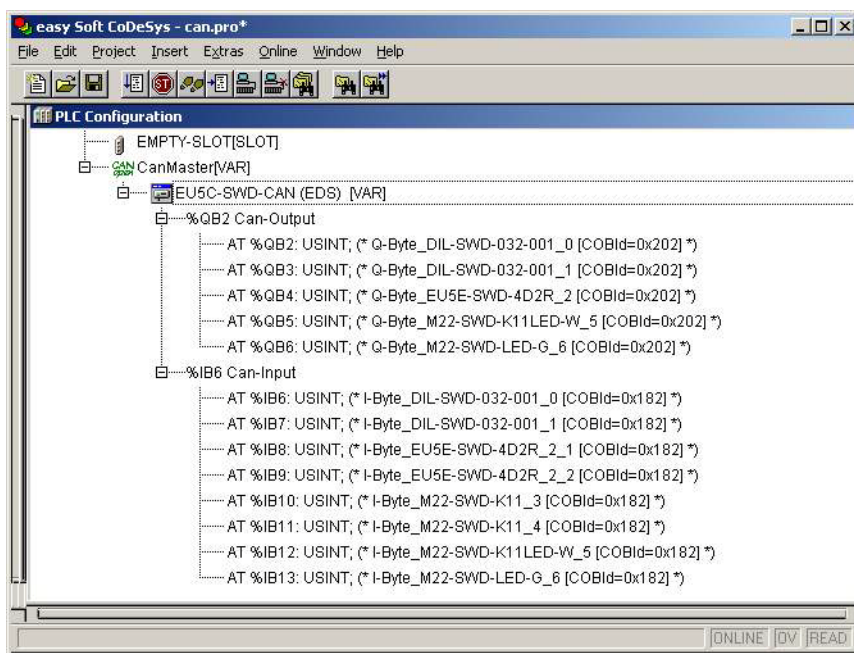


Figure 40: SWD slave addresses

The inputs and, if necessary, the outputs are used as “normal” local inputs/outputs in the application program.



Please refer to the manual MN05006001Z-EN (previously AWB2723-1613en) for the configuration and meaning of the input and output data.

Diagnostics

The system SmartWire-Darwin provides you with a basic diagnosis and extended diagnostic information via emergency telegrams.

Cyclic diagnostic information

This basic diagnostic information is coded in the normal I/O map of each SmartWire-Darwin slave. They provide information about whether the slave is participating in normal data interchange (i.e. the slave is on the network and exchanging data via the SmartWire-Darwin network) and reporting current diagnostic messages. These two information items are located in the first input byte in bit positions 4 and 6 for all SmartWire-Darwin slaves. They permit fast and easy assessment of the status of the SmartWire-Darwin slave.

- The slave is present and integrated actively into the network.
- The slave is operating fault-free.

Example

M22-SmartWire-Darwin-K11-LED-R function element with one byte input (switch position indicator and diagnostic information)

Byte 0:

7	6	5	4	3	2	1	0
Diagnostic data				Input data			
-	P	-	F	-	-	NO1	NC1

Bit	Designation	Meaning
0	NC1 = Normally Closed	0: contact actuated 1: Contact not actuated
1	NO1 = Normally Open	0: Contact not actuated 1: contact actuated
2	not used	-
3	not used	-
4	F = Failure	0: No diagnostic alarm 1: diagnosis present
5	not used	-
6	P = Module present	0: module not present 1: module present
7	not used	-

Outputs:

Byte 0:

7	6	5	4	3	2	1	0
-	-	-	-	-	-	-	Q0

Bit	Designation	Meaning
0	Q0	Actuation LED
1	not used	-
2	not used	-
3	not used	-
4	not used	-
5	not used	-
6	not used	-
7	not used	-

If the SWD slave diagnosis (diagnosis bit = bit 4 is set), details on this can be determined by evaluating the extended diagnostic utilities.

In the case of the SmartWire-Darwin slave considered here the following detailed conditions could be determined.

Value	Meaning
0x10	The contact is longer than four seconds in the middle position.
0x11	There is a short-circuit in the contact.

Extended diagnosis

An extended diagnosis is reported automatically via emergency telegrams in the event of a diagnosis. It can also be read out for each slave via an SDO request. You will find details on this in Chapter "Object directory" on page 111.

PDO communication

A maximum of 16 receive PDOs and 16 transient PDOs are supported. A maximum of 128 bytes are therefore available in each communication direction for utility data interchange.

Only the four default RX PDOs and the four default TX PDOs are active in basic state (after a reset of the gateway). If further PDOs are needed for transfer, PDOs 5 to 16 can be activated by the user.

Ensure that the COB-IDs of the activated PDOs do not collide with the other CANopen slaves in the same network. The addresses of the individual PDOs are derived as follows:

PDO 1 - 4: address = NodeID + standard offset

PDO 5 - 8: address = NodeID + standard offset + 64

PDO 9 - 12: address = NodeID + standard offset + 96

PDO 13 - 16: address = NodeID + standard offset + 32

Accordingly only node IDs in the range 1 to 32 should be used for the gateway.

PDO assignment

As standard byte variables in PDOs 1 to 8 and word variables in PDOs 9 to 16 are mapped. Accordingly process data memory for 64 byte variables and 32 word variables at a time are available without adapting the default mapping. The PDO mapping can be randomly changed by the user.

SDO communication

The simple SDO server connection is supported (expedited SDO server).

Error messages (emergency telegrams)

The errors that are output are governed by /DS301/.

Errors are reported by means of an emergency telegram. The current error status can be read out from the object list entry 0x1001/0. An error history, in which the last six errors are stored, can be read out from the object list entry 0x1003.

Structure of the emergency telegram

Byte 0	bytes1	bytes2	Bytes 3-7
Emcy error code	Emcy error code	Error tab	Error code (extended diagnosis)

Emergency error code

Error code (hex)	Meaning
00xx	Error reset (no errors)
01xx	general error
50xx	Device-hardware
60xx	Device-software
70xx	attached modules (xx = module address)
FFxx	specific to the device

Extended diagnostics:

When "Emcy error code" = 0xFF01 to 0xFF63 is displayed, extended diagnostic messages are specified in bytes 3 to 7. The length of a diagnostic entry is one byte, up to five diagnostic messages being transferred in bytes 3 to 7. Non-used bytes are assigned 0x00 (= no error).

The ID of the slave reporting the error is located in byte 2 of the EMCY telegram. Some examples of extended diagnostic messages are listed in the following table.



You will find detailed information on this in the manual MN05006001Z-EN (previously AWB2723-1613en).

Table 11: Manufacturer-specific messages

Diagnostic code	Meaning	used by
0x00	No diagnostic message active	All devices that support the extended diagnosis
0x10	Contact in middle position	RMQ
0x11	Contact short-circuit	RMQ
0x13	Output overload	I/O module

If "Emcy-Error-Code" = 0xFF00 is displayed, a 32-bit variable with error flags in accordance with Table 12 is stored in the manufacturer-specific area (byte 4 to 7) of the EMCY telegram.

Byte 3 of the EMCY telegram is 0x00.

Table 12: Failure code listing for "Emcy error code" = 0xFF00

Byte	Bit	dwBit	Relevance	Meaning
4	0	0	Info	CANopen: not all reception word variables can be mapped in PDOs.
	1	1	Info	CANopen: not all reception byte variables can be mapped in PDOs.
	2	2	Info	CANopen: not all transmission word variables were able to be mapped in PDOs.
	3	3	Info	CANopen: not all transmission byte variables were able to be mapped in PDOs.
	4	4	Faults	CANopen: no valid CAN baud rate found.
	5	5	Faults	CANopen: no valid CANopen node ID is set (set the value 1 to 32!).
	6	6	-	Reserved
	7	7	-	Free

Byte	Bit	dwBit	Relevance	Meaning
5	0	8	Faults	CANopen: non-correctable CAN stack error.
	1	9	Faults	CANopen: monitoring error (node guarding/heartbeat.)
	2	10	Info	SWD: project configuration check
	3	11	-	Free
	4	12	Info	SWD: extended diagnosis of a slave is pending.
	5	13	Info	SWD: CFG setting of at least one SWD slave changed.
	6	14	-	Free
	7	15	-	Free
6	0	16	Faults	SWD: necessary SWD slave missing.
	1	17	Warning	SWD: optional SWD slave missing.
	2	18	Warning	SWD: actual configuration not equal to target configuration, but compatible
	3	19	Warning	SWD: target configuration not equal to actual configuration, but compatible
	4	20	Faults	SWD: no valid target configuration present
	5	21	Faults	SWD: no valid project configuration present
	6	22	Faults	SWD: differences between target configuration and actual configuration
	7	23	Faults	SWD: differences between project configuration and target configuration
7	0	24	Faults	SWD: short-circuit in the 15 V power supply of the SWD bus
	1	25	Faults	SWD: internal error of the SWD coordinator
	2	26	Info	SWD: at least one SWD slave is transmitting a basic diagnosis.
	3	27	Faults	SWD: no SWD slave found.
	4	28	Info	SWD: the use of compatible slaves is allowed.
	5	29	Info	SWD: all slaves are registered as "optional".
	6	30	Info	SWD: no comparison between target and project configuration
	7	31	-	Free

General

After reception of the NMT telegram "Start Node" it is indicated by the dispatch of an EMCY-telegram that the gateway is still in the SWD mode "Failsafe". This error message is taken back to the SWD mode "normal" after the change.

Failsafe: no initial data are transferred to the SmartWire-Darwin slaves. The initial information of the SmartWire-Darwin slaves is available in the PLC.

Object directory

The object list of the SmartWire-Darwin CANopen gateway consists of static and dynamic entries.

Static entries are available in any case, dynamic entries being generated depending on the attached slaves.

Static entries

CANopen-specific entries (0x1000 - 0x1FFF)

The entries in the CANopen specific area of the object list are created statically and are attainable via an SDO access as soon as the coupling unit participates in CAN communication.

Further information on the type and use of the listed CANopen-specific entries in the object list can be referred to in /CiA301/.

Table 13: CANopen-specific entries

Index	Subindex	Data Type	Default value
Description			
0x1000	0	U32	0x
Device part no. (device profile number + additional information):			
0x1001	0	U8	0x0
Error tab			
0x1003	0 - 6	U32	
Error history			
0x100C	0	U16	0x0
Guard time (node guarding)			
0x100D	0	U8	0
Life time factor (node guarding)			
0x1014	0	U32	0x80+NodeID
COB-ID EMCY object			
0x1016	0 - 4	U16	

Index	Subindex	Data Type	Default value
Consumer heartbeat time			
0x1017	0	U16	0
Producer heartbeat time			
0x1018	0-4		
Identity object			
0x1027	0-100	U16,(Sub0 = U8)	
Module list (VendorID+DeviceID) (rw)*			
0x1029	0-1	U8	
Error behavior object / communication error (rw)			
0x1200	0-3		
Server-SDO-Parameters			
0x1400 – 0x140F	0-2		
RX-PDO communication parameters			
0x1600 – 0x160F	0-8		
RX-PDO mapping parameters			
0x1800 – 0x180F	0-2		
TX-PDO communication parameters			
0x1A00 – 0x1A0F	0-4		
TX-PDO mapping parameters			

User-specific entries (0x2000-0x5FFF)

The following memory locations are scheduled:

Index areas	Entries
0x2000 - 0x20FF	Configuration settings of the SWD master
0x2100 - 0x21FF	Configuration settings of the SWD slaves
0x2200 - 0x22FF	acyclic communication with SWD slaves
0x2300 - 0x23FF	extended diagnostic messages from SWD slaves

Listing of the object entries:

Table 14: Object entries

Index	Subindex	Data Type	Default value
Configuration settings of the SWD master			
Description			
0x2000	0	U8	4(1..7)
Baud rate SmartWire-Darwin (r/w)			
0x2001	0	U8	0(0..1)
Compatibility rule for exchange (0=compatible devices allowed; 1=compatible devices not allowed) (r/w)			
0x2002	0	U8	0(0..1)
Presence of slave devices (0=defined by each slave; 1=all slaves are optional.) (r/w)			
0x2003	0	U8	1(0..1)
Configuration comparison mandatory			
0x2004	0	U32	--
DiagFlags (Table 14.4)(ro)			
0x2010	0	U8	0(0..255)
Delay between cyclic exchange (ms) (r/w)			
Configuration settings of the SWD slaves			
0x2100	0..100	U8	1(0..1)
Presence of device on SWD (0 = device may not be present; 1 = device shall be present. (r/w)			

Index	Subindex	Data Type	Default value
0x2101	0..100	U16	
Device options (parameter/presence) + slave address			
0x2102	0..100	U32	
CFG of devices			
0x2103	0..100		
Serial number of SWD device			
0x2110	0..100	U32	
Parameter of devices			
Acyclic communication with SWD slaves			
0x2200-0x22FF	0..100	U32	
Acyclic communication with slaves (r/w)			
Extended diagnostic messages from SWD slaves			
0x2300-0x23FF	0..10	1...5 bytes	
Extended diagnostics of the SWD slaves (ro)			

Baud rate SmartWire-Darwin (0x2000)

- Content
SmartWire-Darwin baud rate
4 = 125 kbaud (default setting)
5 = 250 kBaud
- Read access
Returns the currently set SmartWire-Darwin baud rate.
(4 corresponds to 125 kbaud).
- Write access
Permissible value range 0 - 7.

Compatibility rule (0x2001)

- Content

General compatibility setting. This defines whether the replacement of a SWD slave by a compatible slave is allowed.

- 0 = replacement allowed
- 1 = replacement not allowed (default setting)

- Read access

Delivers back the current compatibility setting.

- Write access

Definition of the desired compatibility behavior (0 or 1)

Presence of slave devices (0x2002)

- Content

This global entry defines how the SWD network behaves, if no slave is found.

- 0 = it is individually settable for each SWD slave whether it will be treated as an “optional” or “necessary” slave (default setting).
- 1 = all SWD slaves are treated as “optional” slaves.

- Read access

Delivers back the currently valid setting.

- Write access

Definition of the desired behavior.

Configuration comparison mandatory (0x2003)

- Content

Via this entry it can be defined whether the SWD gateway is allowed to start without the performance of a comparison between the target configuration and the project configuration.

- 1 = the SWD gateway also starts up without comparison between the planned configuration and the target configuration. This setting is conceived for CANopen configurators that do not support downloading of the planned module list to the gateway.

If a planned configuration is downloaded to the gateway, a comparison of the configurations takes place.

- 0 = the comparison between planned configuration and target configuration is mandatory (default setting).

- Read access

Delivers back the currently valid setting.

- Write access

Definition of the desired behavior.

DiagFlags (0x2004)

- Content

Via this entry the current status of the diagnostic flags in accordance with table Table 12 page 108 can be read out.

- Read access

The current status of the diagnostic flags is returned.

- Write access

Not permissible.

Delay between cyclic exchange (0x2010)

- Content

Pause time between two SWD cycles in milliseconds
(0 - 255 ms)

- Read access

Currently set pause time

- Write access

Pause time to be set

At present this parameter cannot be changed.

Dynamic entries

The following new entries in the object list are generated each time the gateway is started:

Module list 0x1027

Area 0x2100 to 0x22FF: properties of the SmartWire-Darwin modules

Area 0x6000 to 0x6FFF: utility data of the SmartWire-Darwin modules.

Specification of the dynamic object list entries is performed depending on the target configuration.

Input and output data of the individual SWD slaves are mapped into the PDOs in the order of the SWD network structure.

“Input byte” entry

All input bytes of the SWD slaves are listed.

“Input word” entry

All word input data of the SWD slaves are lined up.

“Output byte” entry

All output bytes of the SWD slaves are lined up.

“Output word” entry

All word output data of the SWD slaves are lined up.

Module list (0x1027)

- Content

Subindex = 0 (U8): the subindex 0 specifies the number of SmartWire-Darwin slaves registered in the target configuration.

Subindex = 1 (U16): module no: an entry (module ID) is generated with the order in which the SmartWire-Darwin slaves were recorded in the target configuration. This entry is formed from the stringing together of the vendor ID and device ID.

- Read access

Data are returned from the stored gateway target configuration.

- Write access

Data are written to the **Planned configuration**. The writing may be performed only in "pre-operational" status.

The list of planned modules can be transferred from the CAN master to the gateway via the entry "Module list (0x1027)".

Presence of device (0x2100)

These local entries define how the SWD gateway behaves, if individual slaves are not found.

- Subindex = 0:

number of slaves recognized on the SWD network

- Subindex = 1 to number of SWD slaves:

This entry defines whether the corresponding slave is allowed to be missing from the SmartWire-Darwin network ("optional"); in this case the SWD network continues to run. Or whether the slave is regarded as being necessary. If a slave is missing, the SWD network is set to failsafe mode.

Settings:

- 0 = slave is allowed to be missing from the network = “optional” slave.
- 1 = the slave is not allowed to be absent = “necessary” slave. (Default setting).

- Read access

Delivers back the currently valid setting for the specified slave.

- Write access

Desired setting for the specified slave.



This setting can also be defined for each slave in the **Service data objects** tab in the CAN-configuration of the gateway.

Module options + slave address (0x2101)

- Content

- Subindex = 0: the subindex 0 represents the number of SmartWire-Darwin slaves registered in the target configuration.
- Subindex = 1 to the number of SWD slaves
- Byte 1 = current SmartWire-Darwin address of the addressed slave
- Byte 2 = bit 0: module has parameter; bit 1: module is present; bit 2 to 7 = fixed on 0.

- Read access

Data are returned from the stored gateway target configuration.

- Write access

Not permissible.

Module CFG (0x2102)

- Content
 - Subindex = 0:
The subindex 0 represents the number of SmartWire-Darwin slaves registered in the target configuration.
 - Subindex = 1 to the number of SWD slaves:
Number and format of the input and output data made available to these slaves

- Read access

Data are returned from the stored gateway target configuration.

- Write access

Data are written to the **Planned configuration**. The writing may be performed only in "pre-operational" status. The module must support the changed configuration settings.

Module serial number (0x2103)

- Content
 - Subindex = 0:
The subindex 0 represents the number of SmartWire-Darwin slaves registered in the target configuration.
 - Subindex = 1 to the number of SWD slaves:
Serial number of the slave found in the corresponding place

- Read access

Data are returned from the target configuration. (stored gateway target configuration)

- Write access

Not permissible.

Module parameter (0x2110)

- Content
 - Subindex = 0:
The subindex 0 returns the number of known parameter entries in the target configuration.
 - Subindex = 1 - 255: parameter data

- Read access

Data are returned from the target configuration. (stored gateway target configuration)

- Write access

Data are written to the **Planned configuration**. The writing may be performed only in "pre-operational" status. The slave must support the changed parameter values.



At present this property is not supported by SmartWire-Darwin slaves.

Acyclic slave access (0x2200-0x22FF)

- Content

An index is reserved for each SmartWire-Darwin listed in the target configuration (index = 0x2200 + SmartWire-Darwin address).

Subindex = 0 - 255: module specific. Acyclic access to the slave data. The subindex is interpreted as a module index.

Maximum of 120 bytes of utility data per access (subindex)

Access via acyclic data traffic to slave data is allowed via SDO utilities in "operational" status only.

- Read access

Slave specific

- Write access

Module specific



At present this property is not supported by SmartWire-Darwin slaves.

Extended diagnosis (0x2300-0x2363)

- Content

An index for the storage of extended diagnostic messages is reserved for each SmartWire-Darwin slave registered in the target configuration. (Index = 0x2300 + SmartWire-Darwin slave address).

A maximum of five diagnostic messages are stored for an SWD slave; the length of a diagnostic entry is one byte.

- Subindex 0: the number of diagnostic messages available for this SWD slave (values 0 - 5)
- Subindex: 1 - 5: diagnostic message

Access via acyclic data traffic to slave data is allowed via SDO utilities in "operational" status only.

The CAN coupling unit stores a maximum of 256 bytes of extended diagnostic messages.

- Read access

Acyclic diagnostic messages

- Write access

Not permissible

Profile-specific entries (0x6000 - 0x7FFF)

Utility data area

Index	Subindex	Data Type
0x6000	0 - 100	U8
I-bytes		
0x6001	0 - 100	U16
I-words		
0x6200	0 - 100	U8
Q-bytes		
0x6201	0 - 100	U16
Q-words		

Input byte (0x6000)

- Content
 - Subindex = 0:
The subindex 0 returns the number of input bytes available in the stored gateway target configuration.
 - Subindex = 1 up to the number of SWD slaves:
Access to the input bytes available in the target configuration.

- Read access

The input byte referenced by the subindex is returned.

- Write access

Not permissible

Input word (0x6001)

- Content
 - Subindex = 0:
The subindex 0 returns the number of input words available in the target configuration.
 - Subindex = 1 up to the number of SWD slaves:
Access to the input words available in the target configuration.

- Read access

The input word referenced by the subindex is returned.

- Write access

Not permissible.

Output byte (0x6200)

- Content

- Subindex = 0:

The subindex 0 returns the number of output bytes available in the target configuration.

- Subindex = 1 up to the number of SWD slaves: access to the output bytes available in the target configuration.

- Read access

The output byte referenced by the subindex is returned.

- Write access

The output byte referenced by the index is output.

Output word (0x6201)

- Content

- Subindex = 0:

The subindex 0 returns the number of output words available in the target configuration.

- Subindex = 1 up to the number of SWD slaves: Access to the output words available in the target configuration.

- Read access

The output word referenced by the index is returned.

- Write access

The output word referenced by the index is output.

Compatibility

The coupling unit stores the data of the devices actually connected when the configuration button is pressed (= stored gateway target configuration).

Each time the gateway starts there is a check whether this configuration has been changed. If this is the case, the data exchange between gateway and SmartWire-Darwin slaves is not started. (In this comparison, the missing slaves are not included, what is important is whether the found slaves are identical.)

A project configuration is specified via the programming system by selecting the SmartWire-Darwin slave (= planned target configuration). This is downloaded automatically to the gateway by the Eaton programming system during transfer of the program to the controller.



**Information relating to the gateway
EU5C-SWD-CAN**

Download of the configuration is an extended utility that is not available in standard CANopen configurators. For this purpose easySoft-CoDeSys offers you the option "Create SDO for module list" in the PLC configuration of the CAN gateway in the **MCAN Module Selection** tab.

If a "Planned configuration" cannot be downloaded to the gateway, the configuration comparison has to be switched off (the parameter "Disable configuration check" in the **Service data objects** tab must have the value 1).

A configuration comparison and a resultant use of the compatibility list is therefore not possible. The user himself must check whether the configuration agrees.

The planned configuration is available

Before data communication between the coupling unit and the field bus master starts, the consistency between the planned configuration and the stored gateway configuration is checked. If the parameter "Compatible devices allowed" is set to 0, a defective SWD slave can only be replaced by a slave of the same type. However, if the parameter is set to 1, deviations are allowed. The application background to this is the facilitated replacement of defective SWD slaves by available, function-compatible, but not identical, types. For example, a green LED element with a switching function is accepted instead of a green LED element, because the more complex element also has the function "green LED".

For the comparison the SWD slaves are subdivided into various families and function classes. Slaves that are compatible with one another must always be in one family. The replacement of an SWD slave for contactor switch-on (DIL-SWD...) is therefore fundamentally not accepted in place of a luminous pushbutton (M22-SWD-K22-LED...), although both would be compatible in terms of data mapping (one input byte, one output byte each).

You can find SWD slaves with their replacement types in the following table.

Table 15: List of types that are compatible with one another

Catalog No.	Description	Allowed replace- ment type 1	Allowed replace- ment type 2
RMQ function elements (front mount)			
M22-SWD-K11	Function element, 2 pos. front	M22-SWD-K22	
M22-SWD-K22	Function element, 3 pos. front	-	
M22-SWD-LED-W	Function element, LED W front	M22-SWD-K11LED-W	M22-SWD-K22LED-W
M22-SWD-K11LED-W	Function element, 2 pos., LED W, front	M22-SWD-K22LED-W	
M22-SWD-K22LED-W	Function element, 3 pos., LED W, front	-	
M22-SWD-LED-R	Function element, LED R front	M22-SWD-K11LED-R	M22-SWD-K22LED-R
M22-SWD-K11LED-R	Function element, 2 pos., LED R, front	M22-SWD-K22LED-R	
M22-SWD-K22LED-R	Function element, 3 pos., LED R, front	-	
M22-SWD-LED-G	Function element, LED G front	M22-SWD-K11LED-G	M22-SWD-K22LED-G
M22-SWD-K11LED-G	Function element, 2 pos., LED G, front	M22-SWD-K22LED-G	
M22-SWD-K22LED-G	Function element, 3 pos., LED G, front	-	
M22-SWD-LED-B	Function element, LED B front	M22-SWD-K11LED-B	M22-SWD-K22LED-B
M22-SWD-K11LED-B	Function element, 2 pos., LED B, front	M22-SWD-K22LED-B	
M22-SWD-K22LED-B	Function element, 3 pos., LED B, front	-	

Catalog No.	Description	Allowed replacement type 1	Allowed replacement type 2
RMQ function elements (base fixing)			
M22-SWD-KC11	Function element, 2 pos., base	M22-SWD-KC22	
M22-SWD-KC22	Function element, 3 pos., base	-	
M22-SWD-LEDC-W	FE, LED W, base	M22-SWD-K11LEDC-W	M22-SWD-K22LEDC-W
M22-SWD-K11LEDC-W	FE, 2 pos., LED W, base	M22-SWD-K22LEDC-W	
M22-SWD-K22LEDC-W	FE, 3 pos., LED W, base	-	
M22-SWD-LEDC-R	FE, LED R, base	M22-SWD-K11LEDC-R	M22-SWD-K22LEDC-R
M22-SWD-K11LEDC-R	FE, 2 pos., LED R, base	M22-SWD-K22LEDC-R	
M22-SWD-K22LEDC-R	FE, 3 pos., LED R, base	-	
M22-SWD-LEDC-G	FE, LED G, base	M22-SWD-K11LEDC-G	M22-SWD-K22LEDC-G
M22-SWD-K11LEDC-G	FE, 2 pos., LED G, base	M22-SWD-K22LEDC-G	
M22-SWD-K22LEDC-G	FE, 3 pos., LED G, base	-	
M22-SWD-LEDC-B	FE, LED B, base	M22-SWD-K11LEDC-B	M22-SWD-K22LEDC-B
M22-SWD-K11LEDC-B	FE, 2 pos., LED B, base	M22-SWD-K22LEDC-B	
M22-SWD-K22LEDC-B	FE, 3 pos., LED B, base	-	

Catalog No.	Description	Allowed replace- ment type 1	Allowed replace- ment type 2
DILM/MSD function elements			
DIL-SWD-32-001	FE, DIL/MSD	DIL-SWD-32-002	
DIL-SWD-32-002	FE, DIL/MSD, manual/auto	-	
I/O function elements			
EU5E-SWD-8DX	Digital module, 8 inputs	-	
EU5E-SWD-4D4D	Digital module, 4 inputs, 4 outputs	-	
EU5E-SWD-4D2R	Digital module, 4 inputs, 2 outputs	-	

Appendix

Meaning of the LED indicators	Description	POW
	Device ready for operation	on
	If the other three gateway LEDs are permanently red, the operating system or the hardware is faulty. If they are permanently orange, the gateway is in Firmware Update mode. This mode can be deactivated by switching on the power supply again.	off

PROFIBUS status LED

Description	PROFIBUS status LED	Data interchange between the gateway and the PLC via PROFIBUS
Cyclic data communication runs on the PROFIBUS. The planned configuration complies with the gateway target configuration.	Green continuous light	Yes
The DP master does not detect a data interchange, because the planned configuration does not comply with the gateway target configuration	Flashing (green)	Yes
No communication takes place on the PROFIBUS. No DP master is detected (for example, on account of a wrong slave address)	off	no
Extended DP diagnostics: The input data from SmartWire-Darwin slaves is invalid or the necessary slaves are missing.	Orange	Yes
The gateway is in firmware update mode when the POW LED is off. The firmware mode can be left by switching on the power supply again.	Changes from continuous light orange to red	no

CAN status LED

Description	CAN status LED	Data exchange gateway via the CANopen to PLC
CAN interface inactive.	off	no
Baud rate detection active on the CAN bus	Red strobe light	no
CAN baud rate detected ,waiting for a valid target configuration	Orange	no
Communication error on the CAN bus. (error warning level reached.)	Red flashing	Yes
Monitoring error (node guarding/heart-beat.)	Red asynchronous flashing	SDO only
Communication error on the CAN bus. (bus Off.)	red	no
Pre-operational initialization mode - communication only possible via SDOs.	Green flashing	SDO only
Stopped - no data exchange.	Green asynchronous flashing	No
Operational - data exchange is possible via PDOs and SDOs.	green	Yes
The gateway is in firmware update mode when the POW LED is off. The firmware mode can be left by switching on the power supply again.	Changes from continuous light orange to red	no

SmartWire-Darwin configurations LED

Description	SmartWire-Darwin configurations LED	Data exchange coupling unit via field bus to PLC
The planned configuration complies with the gateway target configuration.	Green continuous light	Yes
The planned configuration does not comply with the gateway target configuration, but is compatible with it. (list of the devices that are compatible with one another → Table 15, page 127)	Flashing (green)	Yes
The planned configuration and the gateway target configuration are not compatible.	Red continuous light	no
The gateway is in firmware update mode when the POW LED is off. The firmware mode can be left by switching on the power supply again.	Changes from continuous light orange to red	no

SmartWire-Darwin status LED

Description	SmartWire-Darwin status LED	Data interchange between the gateway and SmartWire-Darwin slaves
The current actual configuration complies with the gateway target configuration.	Green continuous light	Yes
A necessary SWD slave is missing or the gateway target configuration does not comply with the actual configuration	Flashing (red)	no
Slave addressing is active (after power On or the download of a planned configuration with empty modules).	Flashing (green)	no
Short-circuit on the 15 V power supply or no SmartWire-Darwin slave is connected.	Red continuous light	no
The gateway is in firmware update mode when the POW LED is off. The firmware mode can be left by switching on the power supply again.	Changes from continuous light orange to red	no

Version table for EU5C-SWD-DP

	operating system: V1.00 Hardware: 01 GSD file: Motorola format (e.g. Siemens STEP7) Moel4d13.gsx Intel-format: (e.g. Moeller): Moe4d13.gsd	operating system: V1.10 Hardware: 01 GSD file: Motorola format (e.g. Siemens STEP7) Moel4d14.gsx Intel-format: (e.g. Moeller): Moe4d14.gsd
SWD station		
I/O modules		
EU5E-SWD-8DX	X	X
EU5E-SWD-4D4D	X	X
EU5E-SWD-4D2R	X	X
DIL-/PKE-modules		
DIL-SWD-32-001	X	X
DIL-SWD-32-001	X	X
PKE-SWD-32		X
Circuit-breaker		
NZM-XSWD-704		X
RMQ-modules		
M22-SWD-K11	X	X
M22-SWD-K11LED-B	X	X
M22-SWD-K11LEDC-B	X	X
M22-SWD-K11LEDC-G	X	X
M22-SWD-K11LEDC-R	X	X
M22-SWD-K11LEDC-W	X	X
M22-SWD-K11LED-G	X	X
M22-SWD-K11LED-R	X	X
M22-SWD-K11LED-W	X	X
M22-SWD-K22	X	X
M22-SWD-K22LED-B	X	X

	operating system: V1.00 Hardware: 01 GSD file: Motorola format (e.g. Siemens STEP7) Moel4d13.gsx Intel-format: (e.g. Moeller): Moe4d13.gsd	operating system: V1.10 Hardware: 01 GSD file: Motorola format (e.g. Siemens STEP7) Moel4d14.gsx Intel-format: (e.g. Moeller): Moe4d14.gsd
M22-SWD-K22LEDC-B	X	X
M22-SWD-K22LEDC-G	X	X
M22-SWD-K22LEDC-R	X	X
M22-SWD-K22LEDC-W	X	X
M22-SWD-K22LED-G	X	X
M22-SWD-K22LED-R	X	X
M22-SWD-K22LED-W	X	X
M22-SWD-KC11	X	X
M22-SWD-KC22	X	X
M22-SWD-LED-B	X	X
M22-SWD-LEDC-B	X	X
M22-SWD-LEDC-G	X	X
M22-SWD-LEDC-R	X	X
M22-SWD-LEDC-W	X	X
M22-SWD-LED-G	X	X
M22-SWD-LED-R	X	X
M22-SWD-LED-W	X	X

The version of the operating system of the gateway and the GSD file used must be identical. There is no downward compatibility. The identity is checked by the gateway when the configuration is loaded.



To update the operating system, choose in the SWD-Assist (version from 1.10) in the Help menu, "Updating the operating system".

The necessary operating systems can be downloaded from the Internet or are provided on your PC in the folder Program Files\Common Files\Moeller\SWD-FW.

GSD files can be downloaded from the Internet at:

<http://www.moeller.net/de/support/index.jsp>

Version table for EU5C-SWD-CAN

EU5C-SWD-CAN	Operating system: V1.00 Hardware: 01 eds file: EU5C-SWD-CAN.eds	Operating system: V1.10 Hardware 01 eds file: EU5C-SWD-CAN_V110.eds
SWD station		
I/O modules		
EU5E-SWD-8DX	X	X
EU5E-SWD-4D4D	X	X
EU5E-SWD-4D2R	X	X
DIL-/PKE-modules		
DIL-SWD-32-001	X	X
DIL-SWD-32-001	X	X
PKE-SWD-32		X
Circuit-breaker		
NZM-XSWD-704		X
RMQ-modules		
M22-SWD-K11	X	X
M22-SWD-K11LED-B	X	X
M22-SWD-K11LEDC-B	X	X
M22-SWD-K11LEDC-G	X	X

EU5C-SWD-CAN	Operating system: V1.00 Hardware: 01 eds file: EU5C-SWD- CAN.eds	Operating system: V1.10 Hardware 01 eds file: EU5C-SWD- CAN_V110.eds
M22-SWD-K11LEDC-R	X	X
M22-SWD-K11LEDC-W	X	X
M22-SWD-K11LED-G	X	X
M22-SWD-K11LED-R	X	X
M22-SWD-K11LED-W	X	X
M22-SWD-K22	X	X
M22-SWD-K22LED-B	X	X
M22-SWD-K22LEDC-B	X	X
M22-SWD-K22LEDC-G	X	X
M22-SWD-K22LEDC-R	X	X
M22-SWD-K22LEDC-W	X	X
M22-SWD-K22LED-G	X	X
M22-SWD-K22LED-R	X	X
M22-SWD-K22LED-W	X	X
M22-SWD-KC11	X	X
M22-SWD-KC22	X	X
M22-SWD-LED-B	X	X
M22-SWD-LEDC-B	X	X
M22-SWD-LEDC-G	X	X
M22-SWD-LEDC-R	X	X
M22-SWD-LEDC-W	X	X
M22-SWD-LED-G	X	X
M22-SWD-LED-R	X	X
M22-SWD-LED-W	X	X

Version V1.10 of the operating system is downward compatible with version V1.0 and can therefore also be used with the eds file EU5C-SWD-CAN.eds as long as no new slaves are used.



If your gateway is using operating system V1V1.0 and you wish to use SWD slaves requiring operating system V1.0 (e.g. PKE-SWD-32), you can update the operating system of the gateway. For this choose the Update operating system function in the Help menu of the SWD-Assist planning software (version from 1.10).

The necessary operating systems can be downloaded from the Internet or are provided on your PC in the folder Program Files\Common Files\Moeller\SWD-FW.

EDS files can be downloaded from the Internet at

<http://www.moeller.net/de/support/index.jsp>.

Technical data

		EU5C-SWD-DP	EU5C-SWD-CAN
General			
Standards		IEC/EN 61131-2, EN 50178	
Dimensions (W × H × D)	mm	35 × 90 × 127	35 × 90 × 127
Weight	kg	0.16	0.16
Mounting		Top-hat rail IEC/EN 60715, 35 mm	
Mounting position		vertical	vertical
Ambient mechanical conditions			
Protection type (IEC/EN 60529)		IP20	IP20
Vibrations (IEC/EN 61131-2:2008)			
constant amplitude 3.5 mm	Hz	5 - 8.4	5 - 8.4
constant acceleration 1 g	Hz	8.4 - 150	8.4 - 150
Mechanical shock resistance (IEC/EN 60068-2-27) semi-sinusoidal 15 g/11 ms	Shocks	9	9
Drop to IEC/EN 60068-2-31	Drop height		
	mm	50	50
Free fall, packaged (IEC/EN 60068-2-32)	m	0.3	0.3
Ambient climatic conditions			
Operating ambient temperature (IEC 60068-2)	°C	−25 - +55	−25 - +55
Condensation		prevent with suitable measures	
Storage	°C	−40 - 70	−40 - 70
relative humidity, non-condensing (IEC/EN 60068-2-30)	%	5 - 95	5 - 95

		EU5C-SWD-DP	EU5C-SWD-CAN
Electromagnetic compatibility (EMC)			
Overvoltage category		II	II
Pollution degree		2	2
Electrostatic discharge (IEC/EN 61131-2:2008)			
Air discharge (Level 3)	kV	8	8
Contact discharge (Level 2)	kV	4	4
Electromagnetic fields (IEC/EN 61131-2:2008)			
80-1000 MHz	V/m	10	10
1.4 - 2 GHz	V/m	3	3
2 - 2.7 GHz	V/m	1	1
Radio interference suppression (SmartWire-Darwin)		EN 55011 Class A	EN 55011 Class A
Burst (IEC/EN 61131-2:2008, Level 3)			
Supply cables	kV	2	2
CAN/DP bus cable	kV	1	1
SmartWire-Darwin cables	kV	1	1
Surge (IEC/EN 61131-2:2008, Level 1)			
Supply cables/CAN/DP bus cable		Supply cables 0.5 kV, CAN/DP bus cable 1 kV	
Radiated RFI (IEC/EN 61131-2:2008, Level 3)	V	10	10

			EU5C-SWD-DP	EU5C-SWD-CAN
Supply voltage U_{AUX}				
Rated operational voltage	V		24 DC -15% +20%	
Input voltage residual ripple	%		≤ 5	≤ 5
Protection against polarity reversal			Yes	Yes
max. current	I_{max}	A	3 ¹⁾	3 ¹⁾
Short-circuit rating			no, external fuse FAZ Z3	no, external fuse FAZ Z3
Heat dissipation	W		Normally 1	Normally 1
Potential isolation			no	no
Rated operating voltage of 24-V-DC slaves	V		part no. $U_{AUX} - 0.2$	part no. $U_{AUX} - 0.2$
Supply voltage U_{POW}				
Supply voltage	V		24 DC -15 % + 20 %	
Input voltage residual ripple	%		≤ 5	≤ 5
Protection against polarity reversal			Yes	Yes
Rated current	I	A	0.7	0.7
Overload proof			Yes	Yes
Inrush current and length	A		12.5 A/6 ms	12.5 A/6 ms
Heat dissipation at 24 V DC	W		3.8	3.8
Potential isolation between U_{POW} and 15 V SmartWire-Darwin supply voltage			no	no
Bridging voltage dips	ms		10	10
Repeat rate	s		1	1
Status indicator	LED		Yes	Yes
SmartWire-Darwin supply voltage				
Rated operational voltage	U_e	V	$14.5 \pm 3 \%$	$14.5 \pm 3 \%$
max. current	I_{max}	A	0.7 ²⁾	0.7 ²⁾
Short-circuit rating			Yes	Yes

Instructions

- 1) If contactors with a total power consumption > 3 A are connected, a power feeder module EU5C-SWD-PF1/2 has to be used.
- 2) If contactors with a total power consumption > 0.7 A are connected, a power feeder module EU5C-SWD-PF2 has to be used.

		EU5C-SWD-DP	EU5C-SWD-CAN
Connection supply voltages			
Connection Type		Push in terminals	Push in terminals
solid	mm ²	0.2 - 1.5 (AWG 24 - 16)	
flexible with ferrule	mm ²	0.25 - 1.5	0.25 - 1.5
SmartWire-Darwin network			
Station type		SmartWire-Darwin master	SmartWire-Darwin master
Number of SmartWire-Darwin slaves		58	99
Baud rate	kBd	125	125
Address setting		automatic	automatic
Status indicator		SmartWire-Darwin master LED: green Configurations LED: red	
Connections		Plug, 8-pole	Plug, 8-pole
Plug connectors		Blade terminal SWD4-8MF2	
Field bus interface			
Function		PROFIBUS-DP slave	CANopen slave
Bus protocol		PROFIBUS-DP V1	CANopen
Baud rate		up to 12 MB	up to 1 MB
Address setting		automatic	automatic
Station address		2 - 125	2 - 32
Address setting		DIP switches	DIP switches
Status display field bus interface	LED	two-coloured red/green	two-coloured red/green
Terminating resistor		switchable via plug	DIP switches
Terminal type field bus		1 × SUB-D, 9-pole, socket	1 × SUB-D plug, 9-pole
potential isolation		Yes	Yes

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